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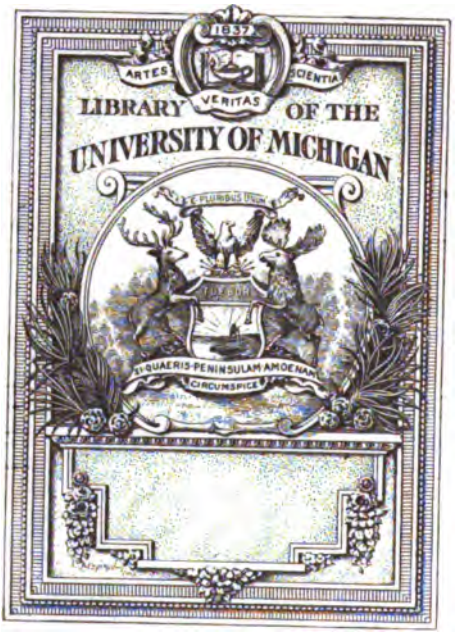

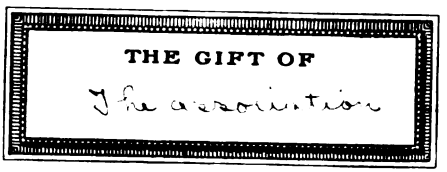

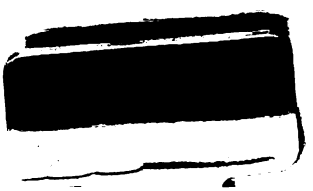

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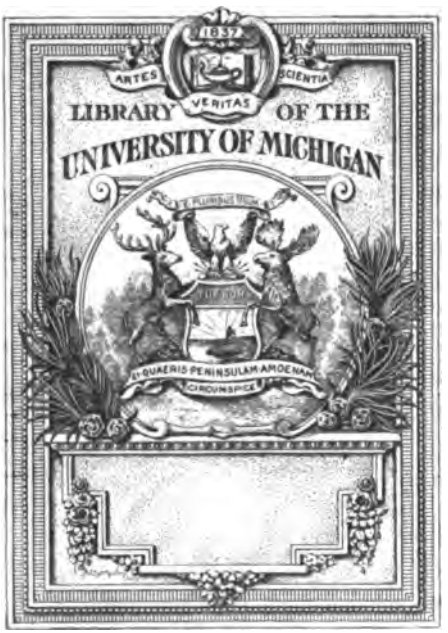

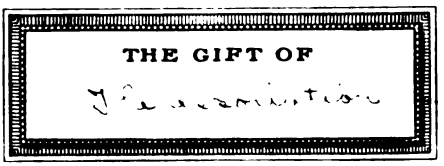

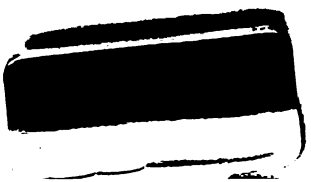

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TRANSACTIONS

OF

The American Urological Association

TENTH ANNUAL MEETING
AT CHICAGO, ILLINOIS
SEPTEMBER 26 AND 27, 1911

EDITED BY
CHARLES GREENE CUMSTON, M. D.

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TRANSACTIONS OF THE AMERICAN UROLOGICAL ASSOCIATION.

IS UROLOGY ENTITLED TO BE REGARDED AS A SPECIALTY?

PRESIDENTIAL ADDRESS BY
HUGH CABOT,
BOSTON, MASS.

It will probably seem to most of those present that this is an unnecessary inquiry, and that the question has already been answered by the rapid rise to prominence of the urologist, particularly in the last ten years. It, however, remains a fact that in the eastern portion of the country, at least, serious doubts still exist as to the propriety of giving to those who wish to pursue this subject opportunities and hospital accommodations which will enable them to do their work under a satisfactory and profitable environment.

It is a curious but noteworthy fact that until within the last few months there was not in New England a single large hospital making any separate or distinct provision for the study of urology except in the out-patient department, and no surgeon controlled any beds for the prosecution of this work. That this condition is not accidental must be clear, and it must therefore depend upon some strong conviction that the admission of urology as a specialty will work to the detriment rather than to the advancement of medicine. It is for this reason that I desire

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to inquire into the facts and set forth my own reasons for believing that the position thus far maintained is an unsound one.

At the outset it will be wise to define what we mean by a specialty, or we shall soon be working at cross purposes. A specialty is, I take it, a portion or subdivision of the field of medicine devoted to the study of the diseases of an organ, group of organs, or group of conditions, the proper treatment of which requires knowledge and skill so much out of the ordinary as to be beyond the reach of the general practitioner. A department of medicine becomes a specialty when our knowledge of the diseases in this department becomes so far developed that it requires the whole time of any individual to keep abreast of the accumulating knowledge and still have time to devote to study of the problems presented.

The claim of urology to be regarded as a specialty began with the development of intricate and difficult methods of diagnosis and treatment. The advent of the cystoscope, the ureter catheter, the development of intravesical operations and the application of the X-ray to diagnosis of conditions in the urinary tract, have taken it out of the field of the general practitioner.

Clearly, the burden of proof lies upon those who would change the existing order, and this burden I am quite prepared to accept. It therefore devolves upon me to show that under the care of the general surgeon, cases of genito-urinary disease are not as well handled as the average of surgical cases, that important errors in diagnosis, or mistakes in treatment, occur with unusual frequency, and that the patient does not receive as sound advice or as efficient treatment as he could obtain at other hands.

Let us review briefly the chief groups of diseases with a view to seeing whether or not their manage-

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ment attains to a reasonable standard of excellence.

Diseases of Prostate. In the last fifteen years the diagnosis and treatment of obstructing lesions of the prostate have been entirely revolutionized. Previous to that time surgical treatment was unsatisfactory and the operative mortality so high as to be almost prohibitive.

Under the combined efforts of a few genito-urinary surgeons in this country and abroad, the diagnosis has become accurate, the indications for operations have been made clear and the technique of prostatectomy, both suprapubic and perineal, has been perfected.

Let it be observed, in passing, that this revolution has been due to the work of men essentially specialists. At the present time the operative mortality in the hands of skilled operators has been reduced below six per cent. The proportion of radical cures is very high and the number of cases unimproved, or worse, small. With this standard the work of the general surgeon will not compare favorably. Statistics are difficult to collect, but efforts made by Whiteside of Portland, and Moore of Indianapolis, tend to show that the general mortality in these cases is still above fifteen per cent.

In many of the large municipal clinics today there frequently appear cases in which prostatectomy has left the patient far worse than before, owing to damage to the rectum, failure of the urinary fistula to close or a joint urethro-rectal fistula. Such accidents are rare in the hands of the specialist, common in the hands of the general surgeon. In these same clinics it is by no means uncommon to see patients who have failed entirely of relief after prostatectomy because their retention was due, not to any lesion of their prostates, but to one of the various cord lesions, of which tabes is the type.

In the management of diseases of the prostate,

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therefore, our knowledge has advanced rapidly and our results can be made good, but the patient is not today receiving, in many instances, the benefit of the knowledge that exists.

Stone in the Bladder. A still more striking instance is to be found in the treatment of uncomplicated stone in the bladder. The operation of litholapaxy is, beyond reasonable doubt, the operation of election. Of it Keyes, Sr., says: —

"Of all the operations that are or have been employed in the treatment of stone in the bladder, litholapaxy, when properly performed, is generally conceded to be the safest and most brilliant. In support of this proposition it is only necessary to adduce the authority of Cabot and Chismore in this country, of Thompson and Harrison in England, of Guyon in France, and of the entire school of Indian surgeons who alone see more cases of stone than all the rest of the world put together."

It remains, however, a fact that a large majority of the cases of stone in the bladder the country over are operated upon by the suprapubic route, thus subjecting the patient to at least considerable confinement to bed, much discomfort and, in my opinion, a considerably higher operative risk. It thus appears that the patient is denied the benefit of the operation of election purely and simply because of the inability of the surgeon to do it skilfully and his unwillingness to refer the patient to those who are skilled in this technique. The situation does not seem to me one upon which the profession may pride itself.

Diseases of the Kidney. Let us glance for a moment at the situation in regard to the management of renal lesions. In this field the recent advances have made themselves most clearly felt, and appropriate treatment is most dependent upon accurate preoperative

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diagnosis. It is still by no means difficult to find a general surgeon in large practice profoundly skeptical as to the value of cystoscopic investigation of renal function and quite willing to trust to the accuracy of his own external examinations. As the result of this willingness nephrectomy is not infrequently done in the presence of two bad kidneys, frequently under the belief that the lesion is tubercular. Under these conditions careful preoperative study would have demonstrated the absence of tuberculosis and the presence of a bilateral lesion.

To the same class belong those who trust to their own opinion, formed at the time of operation from the appearance and external examination of a kidney, in regard to its capacity to sustain life or the extent of the destructive process. No one familiar with the operative findings in carefully studied cases will fail to appreciate that this is an exceedingly doubtful method of diagnosis, and it is because of the willingness to trust to this method that tragedies occur, such as the removal of the only functioning kidney, under the impression that a caseous kidney on the opposite side must be normal because it had a normal contour.

The management of tubercular lesions of the kidney is by no means satisfactory in the hands of the general surgeon. The vast majority of cases are overlooked until the urgent bladder symptoms demand relief. Not infrequently women are subjected to multiple pelvic operations for an irritable bladder, due in fact to a tubercular lesion of the kidney. One patient recently under my care has been operated upon three times for alleged malposition of pelvic organs, believed to be the cause of bladder irritation, while in fact the difficulty arose from renal tuberculosis which is now bilateral. It is by no means rare to meet with cases in which the bladder has been opened above the pubes

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for intractable bladder irritation, only to discover that the lesion is not in the bladder and later to appreciate that the suprapubic fistula can be closed with difficulty, if at all.

There is no general appreciation among general surgeons of the fact clearly known to the specialist that the cure of renal tuberculosis depends upon early diagnosis, and that early diagnosis cannot be made except by the scrupulous examination of all patients with persistent pus in the urine.

Lastly, in this hasty survey of the field let us consider the situation in regard to stone in the kidney and ureter. In the last fifty cases of stone seen at the Massachusetts General Hospital ten per cent had been operated upon elsewhere for removal of the appendix or some pelvic viscus, without relief of symptoms and without the correct diagnosis being even suspected. I am inclined to regard New England as medically educated up to the average, and doubt if the showing in other sections of the country would be essentially better, provided always we could get at the facts.

In all these cases a correct diagnosis could have been made with the means at our disposal if only surgeons were willing to admit that searching examinations by special means are required in all cases of abdominal pain associated with abnormalities of the urine.

I might easily continue to enumerate instances in which avoidable errors have been made, but enough has been said to show that the average general surgeon is not managing these cases in the best interests of the patient. It would be unfair, however, to overlook the fact that there are throughout the country many well-equipped and organized clinics in which the surgical chief has at his disposal diagnostic specialists to supply the data in various groups of

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cases. In these organizations the chief has the benefit of the work of a younger assistant who devotes his time to investigation of patients supposed to have urinary lesions, and supplies the necessary facts. In this way errors of omission are avoided and excellent operative results are obtained. It is the habit of those who approve of this type of organization to point out that in this way specialism is avoided and the general surgeon is enabled to obtain what assistance he needs and yet hold sway over every organ in the body.

The weakness of this argument is that it fails to appreciate that this is but the substitution of one form of specialism for another. The assistant who spends his days with his eye glued to the butt of a cystoscope would probably be admitted to be a specialist, and as such he has my deepest sympathy, for a specialist he must remain to the end, and that of the narrowest type. He is denied the advantages of a constantly broadening career; he is denied the opportunity of carrying to its logical conclusion the results of his own investigation, and the wonder to me is that efficient cogs can be found to fit for a term of years into this piece of complicated mechanism. But it is further true that the surgical chief, whom we are asked to regard as the great head surgeon, is in fact the most special of specialists, a beautifully trained operating machine, whose business it is to review facts obtained by others. If he admits the soundness of their data he must accept their conclusions.

Nowhere in modern medical development has the distinction between the surgeon and the operator been more clearly shown. I would deny that these operators are entitled to be regarded as surgeons at all, and must insist that the surgeon is one who can collect his own facts, where necessary can check up

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in his own person the work of any assistant and, whose patients get the benefit of his judgment on facts obtained by him, not by some less experienced and less wise observer.

Unless prepared to assert that my experience is wholly unusual I think that the unprejudiced observer will admit that the management of the general run of major genito-urinary cases by the average general surgeon is distinctly less efficient than it might be, and that the patient does not as a rule receive the benefit of an investigation as careful as modern methods entitle him to. There is, however, room for sound difference of opinion among unprejudiced observers as to whether these cases can best be dealt with by the urologist or under an organization such as I have above described, which consists of a chief and various satellitic specialists. This, however, is a choice between different types of specialism and a frank admission that specialism of some sort is desirable. The internist is now the distributing center, formerly typified by the general practitioner, and more and more the public is coming to use its own judgment and to investigate rather than to accept blindly the view that all surgeons are equally well equipped for all varieties of work. To this tribunal I am quite prepared to submit the judgment as to whether the patient will be most certain to obtain skillful diagnosis and well-directed treatment at the hands of the genito-urinary specialist or the operative specialist. The former has excluded from his field the majority of surgical problems. He has devoted his time to the study of certain special groups of problems closely associated. He undertakes, or oversees, the whole investigation. He decides what investigations shall be made, whether they have been properly executed and what conclusions may properly be drawn. He will himself carry out any diagnostic

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procedure of unusual difficulty or of special importance, and his judgment must grow progressively sounder with widening experience. With him must be compared the operative specialist, whose problems cover the whole field of surgery and who must be familiar with the disorders of every important organ in the body. It is impossible for him to understand or to execute the various complicated methods of diagnosis, to which new ones are being constantly added, and he must therefore be dependent upon the sound observation of some junior assistant whose technical knowledge may be of the first order, but who can hardly aspire to the well-rounded judgment which time and experience, often hard earned, alone can teach. Though of course a prejudiced witness, I am inclined to believe that the choice must ultimately fall upon him who has elected the narrower field, and that the best result will fall to the surgeon who supervises from beginning to end the investigation and who applies the remedy, rather than to the operator who may be eternally confounded by the error of an assistant.

All this takes no account of another important side of the question, namely, the advancement of science. We have been considering only the patient, but of perhaps equal importance is the development of systems or individuals best equipped to follow the devious border line of advance. There is nothing in the experience of the past which warrants us in believing that the general surgeon or even the operative specialist will pursue to advantage these problems. The important discoveries in this field in the last twenty years have come from those who devoted the chief portion of their time to special work. It is to them that the problems are presented with greatest force and it is from them that we must expect the clearest vision. The operative specialist has con-

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tributed importantly and abundantly to mortality statistics and to him we owe much of our ability to decide what risk we undertake in advising a given operation. From these men have come many important suggestions in regard to technique, but these things are of minor importance as compared with important discoveries in diagnosis and radical changes in treatment.

The cystoscope, the ureter catheter, the various tests of renal function, are the work of the specialist, and upon these depends almost wholly our well-founded belief that accurate preoperative diagnosis in lesions of the urinary tract is today not exceeded in any other branch of surgery, and perhaps not equalled.

If we believe that our organization should be such as to contribute most to the science of medicine, it follows logically that we must give our support to the sound development of the urologist.

DISCUSSION

OF PRESIDENT'S ADDRESS.

DR. BRANSFORD LEWIS of St. Louis (in the Chair): I believe that we ought to grant the special request of our President that we depart from the usual custom of leaving the presidential address exempt from attack. I am a believer in the well-fortified position of this address, and am more willing to have the wish of the President carried out, and open this address to discussion by the members present. I think not only should we be willing to do that, but glad to do it, because an opportunity is here offered for us to express ourselves on a subject that is a crying one. It is an important topic that has been beautifully presented, as you all know, and it is hereby declared open for general discussion.

DR. J. BENTLEY SQUIER of New York: I think the question asked has resolved itself into this: The general surgeon knows that the training of the average urologist has not been sufficient

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to make him a good operator in cases of major surgery. I am not criticising the President's position, because in certain respects I heartily agree with him, but this is one of the reasons why we are criticised and why the general surgeon says, "Well, when it comes to operation the general surgeon can do it better than the urologist." It is my judgment that a great many men who have gone into urology have not had the training in the early part of their career to make them competent to undertake major operations. In any large city we can pick out a number of men who are adequately equipped, but the majority of urologists are not up to it, they have had their training in dispensaries, and have not had general surgical appointments. Kidney and bladder surgery is major surgery; it requires a man with a well-rounded experience, and the only way one can get this is in hospital service. I believe that this is behind the sneer which we get from the general surgeon. He says, "All right, make the diagnosis, and I will operate." And in many instances his position is well taken. The future of urology depends upon educating the urologist to first have a thorough training in general surgery and then devoting himself to his specialty. He is able then to devote himself to special work with infinitely greater success and will be removed from criticism as to his operative ability.

DR. WILLIAM E. LOWER of Cleveland: I want to express my appreciation of this masterly address of our President. It is one of the best papers I ever heard on this particular subject. However, I do not think this organization can go on record as endorsing everything said. I think to say that lithotrity is the best operation for stone in the bladder is a very great mistake, and I want to take personal exception to it. I do not believe that the average man here knows how to use the lithotrite well, but I do believe that everyone here can do a suprapubic operation with practically no mortality. The average general surgeon takes these stones out in a few minutes, sews up the bladder, and the patient is out in a week or ten days. In certain cases I use the lithotrite, but I believe in the majority of cases the suprapubic operation is the method of choice. I think, however, the proper use of the lithotrite should be taught more in our medical colleges than it is at present.

DR. JOHN A. HAWKINS of Pittsburgh: I think it is the duty of the members of this organization to express themselves just as they feel. Personally, I feel that the one great reason for the genito-urinary surgeon being held in derision by the general surgeon is

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the almighty dollar. I believe that the egotism of the general surgeon is only excelled by the man who knows nothing. The man who will claim that he is able to treat every part of the human body and treat it as skilfully as the oculist will treat the eye, is either a knave or a fool. That is without any frills. I believe that each of us is endowed with a moderate degree of intelligence, and I do not believe that any of us will be able to claim that he can remove a foreign body from the brain, or localize a tumor in the brain as skilfully as a man who does nothing else. I believe the neurologist should operate on the brain, just as the occulist operates on the eye. The question which the previous speaker brought up with reference to litholapaxy as compared with lithotomy is one that no person who has ever seen a skillful operator will ever dispute — if he has seen Keegan or Freyer remove a stone by litholapaxy he will never question its superiority. A man who can remove a stone the size of a marble in a few minutes, under a local anesthetic, is the man for me. This continual cutting is the very thing that is making faith cure and Christian Science have the hold that they have. There is no use in cutting unless it is absolutely necessary.

DR. G. K. SWINBURNE of New York: I want to get up just to express my admiration for our President's address, and I am not going to take from him any of the defense which he is perfectly able to make for one thing — litholapaxy. I know, of course, that anybody cannot do litholapaxy unless he has been trained, any more than he can do a cystotomy for stone unless he has been trained. But, on the other hand, nobody would take the position that no case of stone should be cut, any more than he should take the side that no stone should be crushed. One man whom we have all admired and who has passed away, said to me once, "Any damned fool can cut a stone out of the bladder and have good luck in saving his patient, but it does take skill to crush a stone and get it out without injuring the patient." Now, as a matter of fact, surgeons are skilled in taking stones out by cutting; they have not trained themselves in the other method. It was only a few weeks ago that a physician brought a patient to me who was unable to urinate except by lying on his side; then he could empty his bladder, but it was very painful if he attempted to empty his bladder standing up. He had consulted a well-known surgeon in New York, a man of marked ability, who said he must go into the hospital and have an operation for removal of the stone. This patient was brought to me, and even without an anesthetic I put in an

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evacuator and found the stone just a little too large to catch in it. I then put in the lithotrite, made one slight crush, and evacuated the stone. The whole operation took just fifteen minutes, and the patient went back to his home.

DR. CHARLES E. BARNETT of Fort Wayne: I expect that our worthy President has sifted away at this grain and has been cutting the chaff away for quite a while. The subject is a very broad one, for we men here represent so many angles of the proposition. Our work takes up genito-urinary surgery, genito-urinary diseases, gynecologic diseases and gynecology — and that covers a big field, almost all of gynecology — so that the proposition cannot be discussed on any narrow plan. I believe that the general surgeon must be taught his incompetency in this field, and that he should call in the expert in this line, whichever line it is, and have him with him and add to his findings the finding of the urologist. For instance, if you want to run over the body, you can call an internist and find out about the digestive functions, etc. You want this in addition to what you know about the patient. You call in a pathologist and add his findings to your knowledge of the case. But if the man that is called is not a surgeon and does not understand surgical technique, a surgeon must do the operation. I believe that the main thing is to teach the general practitioner and the general surgeon the value of our work, and also teach them as well as ourselves not to look at their patients through the dollar mark.

DR. H. J. SCHERCK of St. Louis: Unfortunately I did not have the pleasure of hearing all of Dr. Cabot's most excellent paper. The establishment of genito-urinary surgery as a specialty is beyond doubt our chief aim. In my opinion this can be best accomplished by a method which has been adopted in some of the hospitals of the country, and which unfortunately is omitted in many. I can be substantiated in the statement that when the city hospitals of St. Louis were turned over to a visiting staff and we were selected as members of it, the fight made at the first meeting of the staff by the genito-urinary men to define accurately where their functions began and where they ended, was strenuous. If we insisted upon our rights in the large hospitals and demanded them we would soon create for ourselves a respect on the part of the general surgeon and the general practitioner and the physicians of the city as well. We have institutions in St. Louis over which we have control of all genito-urinary material, housing a population of four to five thousand dependents.

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At the meeting of the staff of the city institutions the surgeons at once wanted to grab everything in sight. The genito-urinary surgeons of the staff had a vigorous fight, but as a result we have a department of genito-urinary surgery. In the largest hospitals in New York, while they have one in name, I am told by one of the members of the staff of one institution the genito-urinary surgeons have very little influence in controlling their legitimate material. After a good deal of wrangling and after the creation of a department of genito-urinary surgery, we succeeded in getting this agreement as regards our limitations, that to the genito-urinary surgeon belonged all diseases and surgical conditions of the generative organs, bladder, prostate, up to the kidney, and in all kidney conditions in which we made the diagnosis we were to be allowed to operate or treat. The majority of kidney cases referred to us are by the internists, so that we usually make the diagnosis by means of the cystoscope and other exact methods which the general surgeon is unable to do. If every large hospital created services in them so that a department of genito-urinary surgery was as distinct as the gynecologic or obstetric department, the specialty would soon receive recognition. I have been told by Dr. Cabot that it is only recently that he has been able to create a department at the Massachusetts General Hospital. At the Cook County Hospital in Chicago I am informed that while it may happen that a genito-urinary surgeon is on the staff, the general surgeon does all the major genito-urinary operations. It is in the large hospitals that the development and recognition of genito-urinary surgery as a distinct specialty must emanate, and I think all of us who are connected with and have influence in the management and control of large hospitals should see to it that there is created a distinct department of genito-urinary surgery, and that the functions of that department are accurately defined.

DR. ERNEST G. MARK of Kansas City: To quote a certain well-known surgeon in Chicago, I am a believer in team work, but I believe that this team work should come among the genito-urinary men themselves. In other words, I believe that we men who are making a specialty of urology should discountenance the old idea of the "clap doctor." That is where urology first got its black eye.

In our new general hospital in Kansas City the staff was appointed some four or five years ago. I was appointed genito-urinary man on the staff. I went out there and found that my duties consisted in seeing cases of gonorrhœa, in seeing cases of

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venereal sores, and occasionally being allowed to do a cystoscopy. I went out there twice, and then I said, "I will not come again. I absolutely refuse to be placed upon this basis. If you want a genito-urinary department here, all right. But I will not come out and take care of the venereal cases and put urology upon the basis of venereology." The following year I was reappointed. I was called to go out several times, but did not go. Last year we had the pleasure of having Dr. McCallum come to Kansas City, and Mack and I are doing team work — in other words, we have tried and I think we have established in our general hospital there a department of urology. That does not mean venereal diseases, that does not mean merely diagnosis, but it means that the urological department is a distinct diagnostic and operative department, and I believe that if the men would stand together and do team work as urologists, this question would soon be settled.

DR. G. FRANK LYDSTON of Chicago: There has been a great deal of interesting matter brought out by the address and in the discussion. But it seems to me that the fundamental proposition has been overlooked. Surgery and medicine are rapidly becoming hospital propositions. The man without a hospital does not have the proper material. I am speaking of the man who is beginning, not of established men. The profession has built up by its support of the various general hospitals a sort of competition which is rapidly strangling the life out of the general practitioner and out of some of the specialists.

It is not very long since the term "urology" was not known, and the genito-urinary surgeon was regarded as a "clap doctor." At the beginning my own college clinic was largely devoted to entomological researches in crab lice. Strictures occasionally strayed in to be re-operated. With the competition of half a dozen general surgeons it was very difficult to build up a clinic. I maintain that a man who can do an operation upon the kidney, the ureter, the bladder, the prostate, or the urethra, is competent to do any operation in surgery, but he cannot become competent unless he has a thorough surgical training. But we have not yet come into our own. Wherever a genito-urinary man is connected with a hospital he is likely to be a sort of appendage and handmaiden of the general surgeon. As matters are now going, I venture to say the position of urology before many years will be that of handmaid to general surgery. There are men here who know that their chief function is to make urological

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diagnosis for incompetent men who couldn't possibly make a diagnosis.

To go back to the question of the hospital. There is only one way that team work can be done, and that is by different groups of men in the specialty of urology. I believe that the term urology is unfortunate, for it gives the man who merely makes a diagnosis of Bright's just as much right to be called a urologist as we have. I think "genito-urinary surgery" is better. We will have to form groups. We will have to have special hospitals. We can dodge the issue just as much as we please, but this is a commercial age. I do not know of any specialty that is suffering so much from surgical commercialism as our own. We know what the commission business means. We know that a large percentage of the prominent surgeons in our hospitals are doing a commission business. I know several gentlemen who have gone into our specialty here in this city who would practically have been forced out of practice if they had not gone into the commission business. We must combat this by letting the public know that there are hospitals devoted to genito-urinary surgery in which the work is done by competent men. I believe that if the younger men do not adopt some plan like this that the genito-urinary man will inevitably be merely a diagnostician and appendage of our large pospitals. The general surgeon says, "I can do everything that you can do. What is yours is mine and what is mine is mine." And they do brilliant work sometimes — not always. I can see where the general surgeon has done a great deal to advance genito-urinary surgery. When we cannot furnish mistakes enough of our own it helps some for others to do it for us. I remember a case in which a general surgeon actually opened a bladder suprapubically four weeks before I examined the bladder, and overlooked two stones, each as large as an English walnut. To illustrate how thoroughly those gentlemen who have not only coöperated with but tried to absorb this association, entered into the spirit of genito-urinary progress, I think it was not over six years ago that a gentleman who is now an enthusiastic prostatectomist stood up and said that he did not believe that the prostate was an operable field, and proved it by telling of an old man who had carried a catheter in his pocket fifteen years. He is a professor in a school and a member of this Association. I asked the gentleman if he would kindly inform me what the average longevity of the prostatic was after beginning catheter life. He said, "I don't know." Comment is unnecessary.

In reference to this matter of lithotomy and litholapaxy, no

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one has a higher regard for expert work in litholapaxy than I have. But we must consider location. What is going to be done in poor children? Everybody cannot come to Chicago, London or New York. What is the surgeon going to do? He is going to operate. I will venture to say that there are more men in this room who can do a lithotomy than a litholapaxy. I do not believe there would be many hands go up if I should ask how many are competent to do a litholapaxy on a small child. Every man has not the mechanical ingenuity which would enable him to become expert. Still fewer are the men who have the material to operate upon, which would enable them to become expert. I have heard Keegan and Freyer quoted so often as illustrations of the wonderful skill we should all have. Those gentlemen got their experience in India where they had hundreds of cases upon which to operate. In India thousands of cases are dealt with annually, at all ages, particularly in children. So that it is well to use a little common sense in discussing these questions.

A gentleman has made the statement that there should be no mortality in suprapubic sections. He knows that is not true, no truer than the assertion that even in incompetent hands litholapaxy is always safe.

DR. GRANVILLE MACGOWAN of Los Angeles: I do not know why our President threw that apple of discord among us. If there is anything that will get up a real Irish argument among a bunch of surgeons it is to say which is the best, litholapaxy or suprapubic lithotomy. If a man has hands which are fit to drive a spirited horse, he can readily learn to manipulate a lithotrite, and the results in suitable cases are marvelous. One gets his man out of the hospital in three or four days or sometimes in twenty-four hours. I have seen my old friend Chismore do an operation in his office. He had the most marvelous hands I ever saw. If we do a suprapubic operation there are lots of men who do not get well in a month, and some of them do not get well in years. I know one man in the hospital in Los Angeles who has been there seventeen months, operated by one of the very best general sugeons you have ever seen. If Dr. Lower ever gets a stone in his bladder I will guarantee I will have him back at his work in less than a week if he comes to me.

I think my friend Mark has hit the keynote in regard to the other thing. We treat the clap. You know how the public regard the question of gonorrhœa, a shameful disease which anybody should cure easily, while it really is probably the most

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serious disease which affects mankind. If I had to have one of the venereal diseases, knowing what I know, and were twenty-one years of age, I would prefer to have syphilis any day to gonorrhœa. I have seen more misery from gonorrhœa, more lives wrecked, and more careers wrecked, than I have from syphilis. The public do not know this, they do not appreciate this, they have no idea of it, and so if a large proportion of a man's practice is taken up in treating what appears to them a trivial disease, they judge him accordingly. And if it were possible for us to cut it out of our practice, I think that our standing with them would be different.

I do not know any reason why a general surgeon cannot do any operation that a urologist can do. The question is simply this, Is he earnest enough, has he sufficiently the good of his patients in his mind, so that he will prepare himself to do operations on the urinary organs in the same way as upon the bowels, upon the brain or upon the organs contained in the abdominal cavity? I am sorry to say that the ordinary general surgeon will not. He will not take the pains to make himself familiar with the cystoscope, which has been in use over twenty years, and which tens of thousands of men in the world use well. I am glad to see in my town that all of the progressive younger surgeons are learning to use the cystoscope, equipping themselves with the proper means of diagnosis of urinary diseases. They do not rest content with guessing any more. They have no doubt of the usefulness of these means and they learn to use them. Inasmuch as the greater number of these operations always have to be performed by the general surgeon, in all parts of the world — it is only in the large cities that you can get the material for the instruction of the urologist — I do not believe we will reach that beautiful heaven which our chairman would like to have us in.

DR. FOWLER: The splendid address of our President has brought out many very important points for discussion. It seems to me that perhaps the most important of these has not been as fully touched upon in the discussion as its importance demands. Dr. Squier has stated the matter clearly. I wish to add a few words merely by way of emphasis. The field of urology as defined in the paper can be divided broadly into two groups or classes of cases, the minor surgical and the major surgical cases. Now there is no difficulty in dealing with the minor surgical cases. These are willingly turned over to the urologist by the general surgeon for treatment. The only difficulty comes in the attitude of the general surgeon toward the major surgical

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work. If the urologist is to come completely into his own he must show that he is capable of doing that major surgical work as well as or better than the general surgeon. He cannot expect and should not expect to have this class of work in our hospitals admitted to his service if he is not prepared by thorough surgical training to handle major surgical work. It is a question, then, of training, of preparation and experience. If the members of the Association are to come rightfully into their own it is necessary for them to have the fundamental training so absolutely essential for doing good major operative work. It is folly for a man to think that because he is proficient in the use of the newer instruments of precision and can employ the finer methods of examination for purposes of diagnosis, that he is therefore prepared to handle all cases coming rightfully within the province of his specialty. To do the major surgical work of our specialty requires special training and experience in the surgical clinic. We must first acquire this training before we can expect to treat the more important surgical cases, and before we can expect that these cases will be turned over to our service in the hospital. What we need, then, is a more thorough training in the fundamentals of general surgery and wider experience in the surgical clinic.

DR. EDWARD L. KEYES, JR., of New York: I hesitate to prolong any further the discussion upon our President's most interesting address, yet I cannot refrain from expressing my protest against the views of Dr. Lydston. I understood him to state that this is a business age, and that the young man who would make his way as a specialist must do so largely by commercial means, by playing into the hands of the general surgeon and the general practitioner, and even splitting fees when that is called for. I think he is quite mistaken, for he does not take into account the fact that nowadays patients are mostly "from Missouri" and the patients of the more wealthy class do not consult specialists upon unverified medical advice. A specialist who has been doing good, conscientious work in his community for five to ten years cannot be concealed from the knowledge of patients by any combination of commercial physicians.

Dr. Lydston has questioned the survival of genito-urinary surgery as a specialty. Let me assure you, gentlemen, that if we but memorize and live up to the remarks of our illustrious President today, no one can prevent us from being specialists. Twenty years ago there was question as to whether gynecology was a specialty. And though today some doubt may persist

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as to what gynecology is, at least no one denies that it is a most flourishing specialty. Twenty years ago — nay, ten years ago — surgeons were doing all the mastoid operations in New York City. Today you could not get a patient with mastoiditis to go near a general surgeon. But there is a reason for these changes, gentlemen. The men who have established the specialties of gynecology, otology, etc., have done so, not by clamoring for their rights, but by establishing clearly their pre-eminent capacity to do certain things which other men could not do. The bearing of this fact upon urology has been most lucidly set forth in our President's address. With truly ethical propriety, he not only urges us to rally for our rights, but insists that we shall live up to our duties, that we shall excel all others with the ureter catheter, with the lithotrite, and with the knife. If there were more of us who, like him, fulfilled the requisites of the accomplished specialist, there would be no call for this address of his. The existence of our specialty would be established without doubt or cavil. Inspired, therefore, by his ardor, as well as by his example, let us work to fit ourselves for a higher station than we shall ever be called to fill. Let us work for the advance of our art with the absolute assurance that if we do so we shall at least earn a living wage, that we shall see all over the country an ever-increasing multiplication of hospital genito-urinary departments, that our hearts shall be cheered with the realization that those better equipped men who come after us will reap the fruits of our labors, and that nothing under God's blue heaven can prevent us from being specialists.

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THE COMPLEMENT-FIXATION TEST IN GONORRHŒA.

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I wish to call attention to the excellent paper of Dr. H. J. Schwarz, "The Complement-Fixation Test in the Diagnosis of Gonococcic Infections," in the May number of the *American Journal of Medical Sciences*, which, so far as I can see, thoroughly covers the ground, and, in fact, leaves nothing for me except reiteration.

I regard this new test of the blood as the most important advance made in years in the study of gonorrhœa. According to Dr. Schwarz's paper we are not pioneers in this field, as in 1906 Mueller and Oppenheim did the first work in this line, and since then others also, but it is my belief that Dr. Schwarz's work is the first to place this test upon a solid foundation.

This is due to the manner of making the antigen a polyvalent one, it having been found that the antigen made from gonococci taken from one strain will only give a positive reaction in a case of gonorrhœa which belongs to that strain; and in the work done by Dr. Torrey in the Loomis Laboratory, it has been found that there are at least twelve such separate strains. There may be more, but so far as I know more have not yet been discovered; if they are they will have to be included in making up an antigen.

Work along this line was suggested to me by Dr. James C. Johnston, who had the following case: A

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gentleman whom he had treated for some time for chronic prostatitis was about to be married, with Dr. Johnston's permission. He said, "Doctor, is there any other test that would prove that I am well?" It occurred to Dr. Johnston that possibly the reaction test based upon the Wasserman reaction with the gonorrhœal elements might be of assistance, and accordingly an experiment was made, and the test turned out to be negative. It proved to be, however, a rather complicated test, inasmuch as, if I remember rightly, instead of being done as now, with a polyvalent antigen, that is, an antigen made up of all the different strains, a complete reaction had to be made with each strain. But this experiment suggested the line of work which has been carried out at Cornell by Dr. Schwarz. At this time it was supposed that no work had been done upon it, but, as above stated, it seems that several workers in the field had already made attempts, beginning as early as 1906.

This work was begun in the latter part of May, 1910, and up to September, 1910, Dr. Schwarz had examined the blood of some eighty patients taken from my clinic, and from October to April an additional number of 157 cases were examined by the same method, making in all 257 cases from my clinic alone. In this large number of cases the tests seemed to work out satisfactorily.

In January, for some three weeks, the antigen for some reason failed to work properly and all the cases examined during that time were reported negative, whereas some of them certainly should have been positive. It was then found that in the preparation of the antigen some mistake had occurred and the antigen failed to do its work properly. My attention was called to it by one case which should have given a positive reaction. A boy twenty-two years old, who had had gonorrhœa three years before, had

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been irregularly under treatment during that time. He had a slight urethral discharge containing gonococci, an anterior stricture and a chronic prostatitis. It was this case which led me to suspect that there was something wrong, so that in most of the other cases examined during this period the reaction was repeated after a fresh antigen had been prepared, and as some of the cases were returned positive and others negative we felt that we could rely on these reports, but it was not until May that I was able to get hold of this particular case for examination, and in this case, his condition having remained practically unchanged since the examination in January, the blood test was found to be positive, as it should have been.

My idea in reading this paper is as far as possible to present this test from a clinical standpoint. The manner of carrying out the test and making the antigen, etc., is published in Dr. Schwarz's valuable article. In selecting cases we began the test with chronic cases, some in which gonococci could be demonstrated and others in which they could not, in order to get data to go by and gain experience, with the idea of finding out in what kind of cases we should get a positive reaction. It was found that the cases were generally negative in those of long standing and in primary infections early in the disease. In primary gonorrhœa the earliest case to give a positive reaction was one in which it had existed two weeks, though some in which the disease had lasted longer still returned a negative reaction. Following is a summary of the cases examined.

There were two cases with chronic urinary trouble having no history of gonorrhœa and in which no tubercle bacilli could be found, which gave a negative reaction.

Five cases of stricture: One, without gonorrhœal history, was negative. Four with history of previous

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attacks of gonorrhœa (one of these had not had gonorrhœa for ten years), each with a positive reaction.

Of cases of chronic prostatitis in which the prostatitis still existed there were nineteen with a previous gonorrhœal history which gave a positive reaction. There were eleven with previous gonorrhœal history which gave a negative reaction. There were three in which there was no gonorrhœal history, or the history was questionable, which gave a negative reaction.

There were forty cases of disease of the verumontanum. Of these, thirty-five gave a history of previous gonorrhœa. Of these latter, fourteen were positive and twenty-one negative. There were five cases in which the history of gonorrhœa was either doubtful or denied, all negative. There was one in which the history of gonorrhœa was denied, which gave a positive reaction; repeated two weeks later, still positive; the patient being under treatment six months, the reaction then was negative.

One case of impotency without gonorrhœal history was negative.

There were two cases of sterility. One, no gonorrhœal history, negative. One with gonorrhœal history, positive.

There were five cases of gonorrhœal rheumatism positive. Two cases without gonorrhœal history, but whose symptoms possibly pointed to gonorrhœal rheumatism, proved to be negative.

Five cases having had multiple attacks of gonorrhœa; of these, four were negative, and one was positive.

Three cases of recurrent epididymitis; two were positive and in one the blood reaction was doubtful, and on being repeated was still doubtful.

One patient with a slight discharge, containing

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extracellular diplococci which had been stained with methylene blue, history of gonorrhœa twelve years before, gave a weakly positive reaction.

One case having a previous history of gonorrhœa long ago, time not given; no signs of gonorrhœa at present, gave a weakly positive reaction.

A case of masturbation for three years with no gonorrhœal history gave a negative reaction.

One case of epididymitis coming on two years after an apparent cure, that is, two years after the only attack that the man had had, gave a positive reaction. Three cases of epididymitis without gonorrhœal history gave negative reactions.

There were twenty-two cases classified as recently and apparently cured. Of these twelve gave a positive reaction; one weakly positive, nine negative.

Twelve cases in which the test was repeated; of these, eleven gave the same reaction as in the first test; one gave a different reaction.

There were nine cases in which the first test was positive; this being followed by further treatment a repetition gave a negative result.

I note that there were eight candidates for matrimony clinically well. Of these only six gave a negative reaction, two a positive reaction.

One case of urethritis simplex gave a negative reaction.

Three cases which had given a negative reaction returned to the dispensary with a fresh infection.

Three cases of chronic gonorrhœa, by which I probably mean patients with chronic urethral discharge but in whom no local focus could be found, were tested. In two of these cases gonococci were found present. Report was positive; one, no gonococci present, the reaction was positive.

There were nineteen cases in which the patients had had both syphilis and gonorrhœa, and in these

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cases both the complement-fixation test for gonorrhœa and a Wassermann reaction were made. In three of these cases both tests were positive. In six both tests were negative. In eight the complement-fixation test for gonorrhœa was positive and the Wassermann negative. In two the Wassermann was positive and the complement-fixation for gonorrhœa negative.

The question which I have tried to solve and which still remains unsolved, is, does a positive reaction mean that there still exists a focus of living gonococci somewhere in the body, and if so, is such a patient to be looked upon as still capable of infecting? Or, may antibodies formed in the blood persist for an indefinite period after the gonococci are all dead? We have records in several cases where the test was made upon patients who seemed to be clinically well proved to be positive, where after continuation for some months, a second test being made, the reaction was negative. This shows one of two things: either they were cured at the time that they seemed to be clinically well, but the antibodies had not had time to die out, or else they were nearly cured and further treatment accomplished the object sought.

That the blood may show a positive reaction for a long period after the primary infection the following case would seem to show. I had a patient suffering from chronic prostatitis under my care, who had come to me from time to time with a relapsing discharge, and with the discharge there was cloudiness of the urine and involvement of the prostate, and during the whole period of time which I have known this patient — a period of twelve years — I have never been able to demonstrate gonococci. This patient came to my office in the fall. I had not seen him for perhaps two or three years. A test of his blood was

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taken with six strains; the usual antigen as at present made contains twelve strains, but it so happened at this time that six of the strains had died out and Dr. Schwarz was then working with six strains only. The test of the blood was negative. A few days later, having succeeded in obtaining the missing six strains, a new test of the blood with all twelve strains gave a positive result.

In differential diagnosis this test would, I believe, prove most valuable, as illustrated by the following cases. A patient who had a painful arthritis of the knee; the knee was stiff, walking caused pain. Often if he merely stubbed his toe he would be laid up in bed before being able to get around again. For a period of eighteen years he had been in this condition, gradually growing worse. The joint had been treated all these years as tubercular. Shortly before he came to me in November an X-ray had been taken for the first time and the maker of it declared that it did not look like a tubercular joint. An orthopedic surgeon was consulted, who stated that it looked like a gonorrhœal joint, so the patient came to me for an opinion. His history was as follows: He was then thirty-three years of age. At the age of thirteen he acquired a gonorrhœa, and at fifteen he had his arthritis. At twenty-three he had a second attack of gonorrhœa which lasted for a short time. He afterwards married, had one child, now three years old. Before advising anything I had his blood tested, which proved positive. I then put the man on a course of gonococcus bacterins, at first every other day, then twice a week, then once a week, with steady improvement as regards pain, so that at the end of six weeks the patient felt perfectly well, though he had still a stiff knee. The circumference of the knee had reduced three quarters of an inch during that time. His general health was also markedly

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improved. He still has a stiff knee, but there has been no return of the inflammatory reaction in it.

Another case of interest in which a differential diagnosis was called for,—the case of a young man who, after exposure to wet, had pain and swelling in both knees. He was treated for six months for rheumatism and then his physician declared that it was syphilitic. As the young man was looking forward to getting married he was naturally alarmed. He himself had a Wasserman test made, which was negative. He told his physician, who replied that that made no difference, as a negative Wasserman did not prove that syphilis was not present, which is perfectly true. The patient came to me and I had a double test made, for gonorrhœa and for syphilis. As a matter of fact I had treated him at the dispensary a number of years before for gonorrhœa. He had a chronic prostatitis. Examination of his blood was made by Dr. Schwarz. The Wasserman test was negative, the gonorrhœal test was positive.

During this time I have had a number of cases in my private work where the test has been of value, and I have added it to my routine work with the majority of cases that I have enough control over to make them come regularly. One case I recall, sent to me from another city: a patient who was being treated for a chronic gonorrhœa, whose marriage was shortly to take place and who came to me for an opinion. In going over his history it seemed to me that he never had had a gonorrhœa. His condition was much the same at the time of his appearance as it had been in the beginning. It was a slight mucoid discharge containing a few bacteria of different kinds, but was distinctly a verumontanum case. The discharge and his neurasthenic condition were caused by disease of the verumontanum. Examination of his

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blood proved negative and I felt justified in telling him that he probably never had a gonorrhœa.

There were nineteen cases of candidates for matrimony. Of these, nine were positive and ten were negative.

One case of epididymitis: questioning whether it was tubercular, specific, or gonorrhœal, the Wasserman and gonorrhœal tests were negative.

One case of neurasthenia was peculiar: neurasthenic pain in the region of the sacrum, in whom there was a history of gonorrhœa three years before; the prostate was practically normal and was not markedly sensitive to the examining finger. The verumontanum was normal. A few streptococci only could be found in material expressed from the prostate. Examination of the blood for gonorrhœa was negative.

One case of a married man who had been under treatment from March for a supposed gonorrhœa: He made the statement that his condition was unchanged from that which he first presented to the time he came to me. This was an undoubted verumontanum case and an examination of the blood for gonorrhœa was negative.

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THE COMPLEMENT-FIXATION TEST IN GONORRHŒA.

L. E. SCHMIDT,
CHICAGO, ILL.

For the past few years there have been isolated references to the subject of antibodies in gonorrhœa and the complement-fixation test as applied to them, the first of which, I believe, appeared in 1906. However, it seems to me that the credit of working out this method so that it is commencing to appear of practical value belongs to Schwarz and McNeil and to Swinburne and Torrey.

Schwarz and McNeil in the *Journal of the Medical Sciences* for May, 1911, brought this interesting subject to the attention of the medical profession. They demonstrated the practical working of the test to the members of the American Association of Genito-Urinary Surgeons, in May, 1911. It was from this time that I commenced to familiarize myself with it.

I do not wish to go into the technical details of the test, and will refer those interested to the articles mentioned, and to the list of references quoted by these authors. I will, however, briefly recapitulate the technic of the test as carried out by Dr. Matthies, who has done all the laboratory work in connection with my cases.

The regular technic of the Wassermann reaction has been followed in making these tests, using an anti-sheep hemolytic serum. The antigen is polyvalent, and was prepared by the Department of

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Experimental Medicine of Parke, Davis & Co., after the directions given in Schwarz and McNeil's article. It was titrated against definite quantities of complement and amboceptor, using as a negative control serum from a person who had never had gonorrhœa, and as a positive control Parke, Davis & Co.'s anti-gonococcic horse serum. It was found that 0.02 c.c. was the standard amount for making the test. The strength of the antigen decreases gradually, which must always be taken into consideration. Hence, fresh antigen must be had from time to time.

On account of the difficulty encountered in growing and maintaining gonococci on artificial media, it has heretofore been very difficult to prepare a satisfactory antigen. However, relief appears to be in sight. Dr. Carl Warden, of Los Angeles, will soon publish in detail a method of growing the cocci on a medium of his own devising, that bids fair to make it as easy a matter to prepare autovaccine from this micro-organism as it is at present in the case of the staphylococcus. This will greatly facilitate the making of polyvalent antigen, which seems to be essential in this work.

Before going into detail regarding the results of the work in connection with my clinical material, I wish to discuss the possibilities of the test, although Dr. Swinburne has already very ably covered the field.

In the past few years there has been an endless discussion as to the real value of the Wassermann test for syphilis. Naturally, since this test for gonorrhœa is based upon the same principles, I am inclined to believe that its value will be proved to be as great as that of the Wassermann test. If I am not mistaken, the vast majority of serologists have agreed that the Wassermann test (or the Wassermann test with modifications) is based on principles that have a solid scientific foundation. Furthermore, the

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clinician who works with the aid of this test derives information from it that can be obtained in no other way. In other words, it is a test that has come to be a necessity in the field of general medicine. It is true that the Wassermann test (or its modifications) has been found positive, negative, and doubtful, by different workers, in the same patient, within a few days of each other. Naturally, under such circumstances, the Wassermann test is one of doubtful value from a clinical standpoint. Wassermann himself has stated that he believes error in technic is responsible for the different results in such instances, and that in a case of this kind he would ask that the test be carried out by one who is absolutely familiar with his technic and with material which has been prepared in his own laboratory. Then he would stand for the result. In other words, he is not only absolutely convinced of the correctness of the theory on which the reaction is based, but of the accuracy of the test itself. Apparently, the same argument will be brought out against this gonorrhœal test — it has been done already to my knowledge. Facts of this kind, however, will not deter me from believing that the possibilities are as great for this test as for the Wassermann test.

Of course, at the present time this test is in its infancy, in a period of its development where the clinician is the most severe and demands proofs on the part of those who use it, on account of the apparently numerous failures and the absolute inability to put the results of the test always in accord with the clinical findings. I do not come here to advocate the immediate necessity of advising the use of this method of examination in every doubtful case and of adhering to the findings, but I insist that it is the duty of those who are interested in the advance of medicine to take up this mode of examination, so that in the future

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(and the not too far-distant future) it will be on a basis similar to the Wassermann test.

It can be stated in objection to my statements, that no real comparison can be made between gonorrhœa and syphilis. Undoubtedly, the latter is a constitutional disease, with the treponema pallidum found throughout the system, blood stream as well as all the organs and tissues. Gonorrhœa, however, only occasionally becomes systemic, only occasionally gives rise to metastasis and involves organs at a distance from the original seat of infection; and in cases of chronic gonorrhœa the condition is generally localized. Undoubtedly the gonococcus is the cause, and the source of chronic infection is one or more of the adnexa of the anterior or posterior urethra. The same is true in the female, except that the parts involved may be the internal genitalia, the urethra, Skene's or the Bartholin glands. How are we, then, to accept the similarity between these two diseases, except that the gonococcus, after the condition is chronic, gives up toxin (or whatever you wish to call it) to the blood, and in this way gives rise to the agent in the blood for which the test is carried out, just as is done in the case of syphilis. It is not the spirochæte that we look for in the blood in syphilis, but for the antibody whose presence is caused by the spirochæte.

Of what real value would the test be? In my opinion, if the test can be perfected, and if it can be shown to stand on as firm a foundation as the Wassermann test does, both from a correct scientific view and clinical standpoint, I am inclined to believe that a great many problems in connection with gonorrhœa and its treatment will be materially advanced toward their solution. Since gonorrhœa has a great deal in common with syphilis, and since it produces, both in the male and the female, so may sequelæ, some of them of the gravest consequence, I think this is an

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end that all of us should look forward to, and I hope that further work along this line will solve correctly the problems involved.

If we can hope that the blood examination will prove that a male patient is cured, or at least free from chronic gonorrhœa, we would be able to state safely to a patient that there is no further possibility of infection as regards the gonococcus. In what position are we today when a patient comes to the office for examination, stating that he is a candidate for marriage and wishes an answer? I do not care to go into the various methods of examination that are so familiar to all of us. It scarcely needs any discussion on my part to point out the value of such a test from this point of view. I can only say that if the gonorrhœal complement-fixation test proves as reliable as the Wassermann test, it will be a momentous step in advance.

Again, when do we stop the treatment for gonorrhœa? There are different points of view, and neither do I care to discuss this question, but will only say that if at the end of a course of treatment a test of this kind could be brought into use, it certainly would be of great importance to all concerned.

I have only taken up this work in a casual manner, as one might say, taking cases at random from the hospital and my private practice. There are a total of seventy-seven cases and for convenience I have classified them as follows: —

Clinical Diagnosis.	Number of Cases.	Positive.		Negative	
		No.	Per Cent.	No.	Per Cent.
1. Acute.	14	1	7	13	91
2. Chronic.	32	15	46	17	54
3. Epididymitis.	11	5	45	6	55
4. Rheumatism.	5	2	40	3	60
5. Gonorrhœal history from 1 to 10 yrs.	27	2	8	25	92
6. Gonorrhœal history negative.	11	0	0	11	100

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In explanation of the above, I wish to state that in order to have a definite idea of the value and practicability of this test, it is necessary to have information as to the presence or absence of the gonococcus in the discharge, shreds, or expression secretion. It is best not to rely entirely upon the ordinary methylene blue stain whenever doing work of a scientific character, hence the Gram stain should always be used in identifying the gonococcus. Naturally, it is desirable to make the bacteriological examination at the same time. I wish to state that I have failed to do this except in a limited number of cases. In the future it will be an easy matter with the Warden medium.

In the acute cases the gonococcus was found in every instance. I refer only to those cases in this group where the infection has only been very recent, of no longer duration than two to four weeks. Some of these cases were confined to the anterior and others to both the anterior and posterior urethra. Here it will be seen that the test fails. Out of fourteen cases only one was positive and thirteen were negative. This is in accord with the findings of the Wassermann test for syphilis. We are all familiar with the preponderance of negative results, until after the so-called second period of incubation. Now in the chronic cases — I refer to conditions which have existed for longer periods of time, and in these cases the posterior adnexa were involved — the positive percentage figures are more pronounced. In some of these cases the gonococcus was no longer demonstrable, and, therefore, there is a clinical doubt as to the presence of the gonococcus.

Taking the third group into consideration—involvement by extension. We know by operative experience in acute cases of epididymitis in the course of gonorrhœa that the gonococcus is not always to be

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found in the epididymis, yet the positive percentage is about what would be expected from our knowledge of the gonococcus in these cases.

Group 4 includes only the gonorrhœal arthritic cases, regarded by many as only metastatic in character. Naturally, the positive percentage ought to be high, but the figures do not show this. Some of these cases were of long standing and the gonococcus not demonstrable, and hence, from a bacteriologic standpoint, not positively gonorrhœal in character.

In Group 5 are included cases of chronic recurrent discharges with chronic conditions. Here the negative findings are very high. This is in accord with my views. I believe, as a whole, that the gonococcus does not remain latent in as large a number of cases as some are inclined to believe.

Group 6 of this classification are cases where there was a negative history to gonorrhœa and where no sign or symptom indicated that the patient had ever had a gonorrhœa. The test was negative in every instance, which certainly is bearing out very strongly the accuracy of the test.

It is not to be forgotten that if the presence of the gonococcus cannot be noted in one or more of the ways mentioned, the accuracy of the test cannot be positively established. Yet if the test is exploited and every angle of the question examined, it will be put on a basis similar to the Wassermann test, and the result will stand even if the gonococcus cannot be demonstrated. It is in just this class of cases that it will come into paramount importance in considering the questions which I have already suggested.

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OBSERVATIONS UPON THE PERSISTENCE OF GONOCOCCI IN THE MALE URETHRA.

EDWARD L. KEYES, JR.
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Surely none of us have any precise ideas as to how long the gonococcus may survive in the glands tributary to the male urethra; for if they may survive a year or two (as they surely do), who shall deny them a decade? Not I, for one. And yet I have not seen it. I have never known the gonococcus to survive in a male host for more than three years. I believe I could count upon my ten fingers the instances of a survival of eighteen months or more that have come under my observation. I recollect but one instance in which a year's treatment at my hands failed to free the urethra of gonococci. But I hasten to attribute this result to nature rather than to art. One of my most obstinate cases I undertook in the second year of his gonorrhœa. I treated him for six months or more: he still had gonococci. He then deserted all medical treatment for six months. Then he married, and soon therafter returned to show me that he was (as far as I could tell) entirely well. To be brief, I have never known the gonococcus to persist in the male urethra for more than three years, while in at least ninety per cent of cases it disappears, with or without treatment, within a year.

Upon what is this opinion founded? Not upon the cases and statistics I am about to cite. These do but illustrate and in some measure confirm my

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opinion. But this opinion is founded upon a double basis. First my own inability, in spite of an alert interest in the subject for more than a decade, to find exceptions to the rule; and second, the insufficient evidence upon which exceptions are alleged either by physicians who have seen individual patients before they reached my hands or by those who write.

What, then, is sufficient evidence that the male urethra is or is not free from gonococci? We may divide the patients who come with this question upon their lips into four classes, as follows: —

(1) Patients who have apparently been cured at least three months of a gonorrhœa and who show (*a*) no purulent shreds or free pus in the morning urine and (*b*) no pus in the secretion expressed from prostate and vesicles. The observation of the clinician is sufficient to declare such persons clean without any laboratory confirmation.

(2) Patients (usually brief cases) in the same condition, but whose probation of three months has not elapsed. To declare these well the clinician must be fortified by an expert examination for the gonococcus, which should not be made until the patient has remained entirely well, without treatment, for at least two weeks.

(3) Patients (usually with a chronic pearly morning drop) with mild chronic anterior urethritis (and perhaps superficial posterior urethritis as well), and who show (*a*) only purulent shreds in the urine and (*b*) little or no free pus in the expressed prostatic and vesicular secretion. Such cases are usually gonococcus-free, but their clinical diagnosis requires expert laboratory confirmation.

(4) Patients with free pus in the urine, which, in chronic cases, is usually in large part from the prostate or vesicles. The presence of gonococci in such cases is suggested by the occurrence of complications

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(acute urethritis, prostatitis, epididymitis, rheumatism, etc.), either spontaneously or as a reaction to local (sounds, injections, sexual intercourse) or general (alcohol, exercise) irritation. Yet such clinical signs have no absolute value in diagnosis, for among the most irritable types of urethritis are certain non-gonococcic ones, while certain urethræ, though still harboring gonococci, are benefited by exercise, alcohol, sexual intercourse and sounds. This class of cases, therefore, always requires laboratory confirmation.

TECHNIC OF CLINICAL AND LABORATORY EXAMINATION.

For the clinical examination the patient partially empties his bladder, submits to a thorough prostatic massage, delivers a drop of the expressed secretion upon a slide, then empties his bladder. The clinician then examines for pus: —

1. The discharge (if there be any).
2. Shreds fished from the urine.
3. Centifuged first urine.
4. Expressed prostato-vesicular secretion.
5. Centrifuged second urine.

The finding of a few white cells per field does not justify the clinical diagnosis of "pus."

I commonly employ the sound, alcohol and physical exercise in the treatment of chronic urethritis, but not directly for a gonococcus diagnosis. Yet most of my patients have been tried by these irritants in the course of treatment before coming to the final test.

GONOCOCCUS DIAGNOSIS.

The chief care of the clinician should be not to attempt too accurate a diagnosis. Pus he can readily identify, and from the presence or absence of pus derive inferences accurate up to a certain point. It

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is in overstepping this limit, in attempting a direct gonococcus diagnosis by the limited means at his command, that he errs.

There is an oft-quoted statement to the effect that the gonococcus may be accurately diagnosed by the Gram stain in ninety-five per cent of cases. What then is the "five per cent" of error? Most of us have attributed it, I fancy, to errors in technic, in preparation and staining of the specimen, etc. But all such sources of errors may be eliminated without making the Gram a perfect differentiating stain. There remain an astonishingly large proportion of cases of non-gonorrhœal urethritis, the examination of whose pus in smears by a truly expert bacteriologist discloses the presence of bacteria more or less closely resembling the gonococcus. Thus among the 102 examinations by smear and culture (recorded in the tables herewith), made for me by Professor Elser, and Dr. Huntoon of the Cornell Medical School, eighteen showed gonococci (six of them by smear alone), while fifteen showed bacterial forms more or less closely resembling the gonococcus when stained by the Gram, and required further evidence to identify them precisely.

Pray do not overlook the fact that in one and the same sentence I question the precision of diagnosis by smear alone for fifteen cases and yet grant it accurate for six others. For in certain cases the gonococci are so numerous and typical in the smear that even though one fails to cultivate them (for reasons to be discussed later) the diagnosis from such smears, if in accord with clinical conditions, may be accepted as entirely adequate.

But—to get back to our original proposition—the clinician does not check up his observations by careful cultures and to his eye every Gram-negative intracellular coccus is a gonococcus. Indeed, many

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doubtless even omit the formality of a Gram stain. Under such circumstances a positive diagnosis of gonococci is justified only in the presence of *both* of two conditions; *i.e.*, (1) clinical evidence of gonorrhœa, and (2) the presence of numerous typical gonococci.

These conditions are always fulfilled in cases of uncontrolled acute urethritis and for the diagnosis of these the clinician need scarcely ever enlist the services of the bacteriologist. But chronic or nearly cured urethritis often fails to present sufficiently clean-cut features to justify a positive or a negative diagnosis from the clinician. Indeed, so little faith do I put in my own bacterial diagnosis of chronic urethritis that I do not waste time to make more than one examination of a doutful case. If that is negative, or if the urethritis is apparently cured, or non-gonorrhœal, I entrust the bacterial diagnosis to the laboratory.

Such being my point of view, I need pretend no sympathy with the conclusions of those writers who, flying in the face of clinical facts, found a diagnosis of gonorrhœa, years after a clinical cure, upon a few Gram-negative intracellular cocci. Indeed, patients upon whom this type of unjustified diagnosis has been made and physicians who put faith in these reports are, as you well know, among the woes of the specialist.

So much for the clinician. The bacteriologist's diagnosis rests upon a totally different basis. By smear and culture he can usually distinguish the bacteria present in the fluids submitted to him. Thus he may err through his own fault or through the fault of the clinician who submits the specimens to him, and the precision of his diagnosis depends upon a well-prepared specimen as much as upon his own skill.

This double point of view is peculiarly important to our understanding of gonococcus diagnosis. A

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"well-prepared" specimen must be fresh, for there is grave probability that gonococci that have remained in cool urine for half an hour cannot be cultivated. Moreover, it must cover the gound, notably the prostate and vesicles.

The technic I at present employ (and have employed in cases 1–33, 67–86 of the present series) is the following: —

(1) Sometimes the patient takes a smear of his morning discharge, but this is usually of little interest.

(2) He retains his urine three or four hours (if possible), and then comes to the office, has his glans penis washed with boric acid solution and passes part of his urine (about 100 c.c.) into a large sterile test tube. This he keeps warm by putting it in his vest pocket when he dons his clothes.

(3) I then thoroughly massage the prostate, vesicles and membranous urethra and send the patient immediately to the laboratory, where he urinates into a sterile test tube. The specimens are promptly centrifuged and examined. All smears are stained by the Gram method. Cultures are made upon ascitic agar streaked with aged human blood serum.

By this method the contents of the important posterior urethral glands are not obtained absolutely uncontaminated, yet the admixture of rapidly growing urethral organisms is reduced, and the smears tell quite accurately the preponderance of bacteria in each specimen. In six instances gonococci were found in the second urine passed and not in the first, and eight times this second urine was sterile while the first urine passed was infected.

But the possibilities of error on the part of the bacteriologist are not exhausted with proper preparation of the specimen. Recognizing that all microscopes are much alike, we often forget that the bac-

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teriologist — the man behind the gun — has as much personality as the physician. Bitter experience has taught me that for a gonococcus diagnosis the very best opinion is the only one worth having. Yet even the best bacteriologic skill may err or may fail to reach a conclusion.

Smears may be inconclusive either because they show, —

(1) Typical gonococci, but so few in number as not to justify a diagnosis (cases 46, 61); (2) bacteria resembling gonococci (cases 26, 45, 49, 60, 63, etc.), or (3) so many bacteria that the bacteriologist fears the gonococci may be concealed by them. Difficulties (1) and (2) are solved by culture or by repeated examination; (3) by local treatment of the urethra to reduce its flora.

Apart from the common laboratory accidents, cultures of a well-prepared specimen may fail because they are overrun with rapidly growing organisms which inhibit the growth of the gonococcus, or render its isolation impossible.

Whereas in my series the gonococcus was identified six times in the smears only (cases 18, 27, 50, 53, 54, 59) it was twice (cases 53, 55) identified in culture only.

The bacteria that may simulate the gonococcus are, —

1. *Micrococcus catarrhalis*. This organism is not uncommon in the upper air passages. I have encountered it but once in the urethra, in a case of simple urethritis (not in this series). It is Gram-negative and may appear as an intra-cellular diplococcus. In culture the atypical forms sometimes resemble the gonococcus, but may be distinguished by the growth at room temperature, the failure to ferment glucose and the complement deviation test.

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2. *Diplococcus crassus.* This extra-cellular diplococcus is distinguished by culture. It appeared twice in case 72.

3. *Irregular types of cocci.* In a small percentage of cases the normal urethra (and in a somewhat larger percentage the normal vagina) contain Gram-negative cocci which, as a rule, can be differentiated from the gonococcus by their form, size, and extra-cellular position. These organisms fail to grow on the usual cultural media.

4. Most important of all are the so-called "degeneration" forms of staphylococci. These occurred in eleven of my cases and were a most fruitful source of confusion. Indeed, judging by the frequency with which Professor Elser finds them, and the accuracy with which they may simulate the intra-cellular Gram-negative gonococcus, these staphylococci are responsible for most of the errors in smear diagnosis.

These "degenerated" staphylococci are organisms which in the process of dissolution become both intracellular and Gram-negative. They assume, as we should expect, a variety of sizes and groupings and are usually outside the cells. In the majority of instances they are, therefore, morphologically different from the gonococcus, yet exceptionally they may and do so closely imitate it as to require a second examination for a diagnosis (cases 9, 63). Indeed the rare "gonococci" of cases 46 and 61 were perhaps degenerated staphylococci.

Fortunately these "degenerated" forms do not appear in culture, but unfortunately their undegenerated brethren are likely to multiply so freely as to overshadow any possible gonococcus colonies, and so require a second examination.

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Thus, even the most competent bacteriological examination may leave the clinician in doubt — for a time at least — and require, if only to save time, laboratory information of another sort.

Until within the past year we have possessed no such information, but now, in the complement-deviation test for gonococci devised by Dr. H. J. Schwarz, of Cornell, we have a most excellent means of diagnosis. Since Drs. Swinburne and Schmidt have just read you a contribution upon this subject, I need not delay to expound the technic, and shall confine myself to a brief review of my experience with it.

Within its limitations I have found the complement-deviation test singularly accurate. But its limitations must be constantly borne in mind. It records the reaction in the blood of an inflammation which is confessedly often very localized and superficial. Consequently, we must not expect too much of it in early or mild cases of urethral gonorrhœa. On the other hand, if this blood reaction becomes marked and persists for many months it may continue positive for an indefinite time after the gonococci have disappeared. Hence, certain rules may be laid down for the interpretation of Dr. Schwarz's test, as follows: —

I. A positive reaction in the blood may not be looked for until the gonorrhœa has persisted long enough to produce such a reaction. This usually requires about a month.

I have obtained a + — reaction in twelve days (Case 6), and in another instance a negative reaction after two weeks (Case 21–II).

A gonorrhœa controlled from the outset, or chronic and mild, might be expected not to give a blood reaction. Yet such is rarely, if ever, the case. In

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Case 9, a gonorrhœa, so well controlled by protargol for four weeks that I thought it cured, showed a strong positive blood reaction and gonococci were found in the prostatic secretion. On the other hand, no case of chronic gonococcic urethritis has failed to give a positive reaction, save one (Case 22) in which a mild gonorrhœa of seventeen months' duration gave a + — reaction, followed six and a half weeks later by a reaction so weak as to be, in Dr. Schwarz's own words, "practically negative." Yet eight weeks later, without confessed or apparent reinfection, the reaction was strongly positive and gonococci were found.

II. A chronic gonorrhœa, especially if severe, may (or may not) leave a persistent reaction for a period of weeks or months, the limit of which period has not yet been determined. Dr. Schwarz estimates six weeks as an average maximum allowance. Yet I have seen two striking and authentic instances of blood reaction persistent for months.

The first (Case 10) was a most virulent initial gonorrhœa of eleven months' duration, during many months of which time the patient was practically confined to the house by sub-acute pyelonephritis. This patient was free of pus and apparently cured in May, 1910. Professor Elser at that time could find no gonoccocci. Yet seven months later the complement-deviation reaction was strongly positive, and two months thereafter negative, the patient having taken no treatment and manifesting no evidence of disease throughout this time.

The second case consulted me for persistent relapsing urethritis. Professor Elser was unable to find gonococci, and I, attributing his troubles to prostatitis, relieved him by a brief course of prostatic massage. Yet Dr. Schwarz obtained a positive reaction and repeated this three months later, though

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the patient had been without symptoms or treatment all this while. Two months after that, however, the complement-deviation reaction was "practically negative."

Hence, dependence upon the complement-deviation reaction exposes one to the possibility of delaying the guarantee of cure for several months. Yet occasionally, as in the cases above cited, clinical and bacteriologic evidence may combine to warrant the assurance of a cure before the blood becomes negative. Otherwise one must wait.

But if the complement-deviation test is so accurate, may we not substitute it for the bacteriological examination? It were premature to answer this question in the light of our present experience.

The complement-deviation test has been proven wrong in one examination (Case 8) out of forty-seven; the bacterial test once (Case 15) in over a hundred examinations. For brief gonorrhœas successfully treated by repressive (commonly called abortive) injections one must depend chiefly upon the bacteriologist, for all others it is safest to employ both.

But the complement-deviation test opens up new possibilities for solving medico-legal problems. Let me cite an example:–

Case 21 was a married man who had acquired a gonorrhœa months previously and had infected his wife. No gonococci were found in the urine and he was declared free from infection, although his urethritis was not cured. His wife was also examined and pronounced cured. No blood test was made upon either. Yet six months later he returned, denying extramarital exposure, but showing a fresh gonorrhœa two weeks old. Both he and his wife immediately submitted to the complement-deviation test and both were negative. Four weeks later he

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was positive and she negative, while she remained clinically clean. This development of a positive reaction in him showed his infection to be a fresh one, due to extramarital exposure, in spite of his fervent denials.

DURATION OF GONORRHŒA.

The tables herewith classify briefly the results of laboratory investigation of eighty-four patients clinically cured, or nearly cured, of urethral gonorrhœa (Cases 21 and 53 twice investigated). Thirty-three were investigated by the complement-fixation test, seventy-seven by smear and culture. In five instances the patient was believed to be still infectious, and this belief was borne out by the laboratory findings; in twenty-six the patient had active urethritis believed to be post-gonorrhœal (P. G. U.), yet in eight of them gonococci were found. But among fifty-one with clinical evidence of cure (only shreds or light haze in urine) only two (Cases 9 and 53–III) showed gonococci — both of them brief cases temporarily controlled by repressive injections — while one (Case 48) was passed as clean by both clinic and laboratory, yet relapsed, and gonococci were found a week later. (The relapse did not appear to be a new infection.) Hence, I estimate about four per cent of clinical error in cases apparently cured. However, in ten cases (1, 15, 16, 22, 26, 27, 49, 53, 54, 59) the clinical presumption of cure was not fully certified by the laboratory findings.

Nevertheless, with all allowance made, I feel justified in stating that sixty-four cases of gonococci disappeared in less than a year, in seven others with urethritis examined from two to eight years after the onset gonococci were not found, while in five (4, 22, 26, 54, 79) gonococci persisted for from one to two years.

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In almost all cases these conclusions were verified by examination of the patient a month or so after the cure had been pronounced. Moreover, I had the opportunity of examining nine cases from two to eighteen years after a clinical cure (Cases 3, 5, 11, 33, 17, 52, 62, 69, 74). In none of them were gonococci found, though the misleading "degeneration" form of staphylococci appeared in Case 11.

Only twice were gonococci found in cases of urethritis of more than two years duration, viz.: —

Case 16 had for several years suffered more or less constantly from a urethral discharge, with exacerbations, and with promiscuous cohabitation galore. Gonococci were found and attributed to a recent infection.

Case 15, on the other hand, had a single urethritis five years ago in which frequent examinations by the late Dr. Otis failed to reveal gonococci. He denied having had sexual intercourse with his wife or any one else for the whole five years. He came to me, having consulted no one in the two years since Dr. Otis's death. My clinical examination revealed only a mild chronic urethritis, but Professor Elser found gonococci and the patient went home (one hundred miles from New York), infected his wife and developed an acute gonorrhœa himself. Curiously enough, in this case Professor Elser made his one error, pronouncing the patient gonococcus free on a second examination. But happily, before I communicated this report to the patient his new infection had blossomed and six months later he was apparently back to his mild chronic catarrh, as was his wife, and Professor Elser declared him probably gonococcus free. Yet the blood was positive. But nine weeks after this it was negative. My diagnosis of this case is that the patient is an amiable liar.

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All of us have encountered cases such as these. We must perforce interpret them as fairly as possible in the light of all other cases. I have never seen one of them that convinced me he had harbored gonococci more than three years.

TABLE I.

DIAGNOSIS BY BLOOD EXAMINATION.

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination.	Blood.	Bacteria.
1	? 3 mos.	P. G. U. *	+	Strepto. and Gram neg. bac.
2	I. 2½ weeks.	Well 1 week.	—	
		2 weeks later.		No gonococci.
		4 weeks later.		No gonococci.
3	I. Brief.	Cure 4 yrs. Str.	—	No examination.
4	I. 18 mos.	Well 18 mos.	—	Gram.-neg. coccobacilli (colon?) Few streptococci.
5	III. ?	Cure 7 yrs.	—	No examination.
6	I. 12 days.	Cured.	+ —	
		4 weeks later.	+ —	Proteus, staph. and streptococci.
		12 weeks later.	—	
7	?	Stricture 7 yrs.	—	No examination.
8	I. Brief.	Well a year.	++	Staph. aureus and albus.
		8 weeks later.	—	
		12 weeks later.		Strepto. and staph. Alb.
9	II. 4 weeks.	Cured. Pus in prostate.	++	I. Staph. albus. II. Gonococcus.
		1 week later.		Same as above.
		3½ weeks later.		II. Staph. Degenerated forms.
		4 weeks later.		Streptococci.
		1 week later.		II. Streptococci.
		4 mos. later.	—	
10	I. 11 mos.	Just well.		Staph. Pseudodipth. bac.
		7 mos. later.	++	
		2 mos. later.	—	

* Post-gonorrhœal Urethritis.

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TABLE I.—*Continued.*

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination.	Blood.	Bacteria.
11	I. Brief.	Well 3 yrs.	—	I. Staph. alb. and pseudo-diphth. bac.
		Pus in 1 prostate.		II. Same and small Gram-neg. bac. Degeneration forms in films.
12	I. 6 weeks.	Cured.	—	No examination.
13	III. Brief.	Cured 3 mos.	—	Staph. alb. and strepto.
14	II. 1 yr.	Probable P.G.U.	+	Staph. albus and strepto.
		3½ weeks later.		Sterile.
		4 weeks later.	+ —	
15	I. 5 yrs.	P. G. U.		I. Staph. alb. and pseudo-diphth. bac.
				II. Same and gono.
		1 week later.		Staph. alb.
				II. Sterile.
		6 mos. later.	—	I. Pseudo-diphth. bac.
				II. Gonococci (?) Cultures failed.
		9 weeks later.	—	
16	? 7 yrs.	Gonorrhœa.	+	
17	I. Brief.	Cure 18 yrs.	—	Sterile.
18	I. 4 mos.	Gonorrhœa.		I. Sterile.
				II. Gonococci in smears. Pseudo-dipth. bac.
		5 wks. later: cured	—	II. Staph. alb.
		2 wks. later.		II. Pseudo-diphth. bac.
19	II. 1 mo.	Cured 18 mos.	—	Staph. alb. and strepto.
20	?	P. G. U.	—	I. Striptococci.
				II. Sterile.
21	I. Several mos.	P. G. U.		I. Pseudo-diphth. bac.
				II. Sterile.
	II. 2 weeks.	3½ mos. later.	—	Gonococci.
		4 weeks later.	+	
22	II. 17 mos.	P. G. U. (?)	+ —	
		6½ weeks later.		
		8 weeks later.		Gonococci and staph. alb.
		Later.		No gonococci.

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TABLE I.—*Concluded.*

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination.	Blood.	Bacteria.
23	I. 10 mos.	P. G. U.	—	Staph. alb. and strepto.
24	II. 18 mos.	P. G. U.	—	No examination.
25	Many relapses.	P. G. U.	++	I. Staph. and pseudo-diphth. bac.
				II. Staph. Cultures failed.
		11 days later.		II. Sterile.
		7 weeks later.	+	
		6 weeks later.	—	
26	II. 3 mos.	Gonorrhœa.		Staph. alb. and pseudo-diphth. bac. Gonococci (?)
		9 mos. later. P. G. U.	+ —	Same and strepto. and xerosis bac. but probably no gonococci.
		7 weeks later.	+ —	
27	I. Several mos.	P. G. U.	+ —	Strepto. and pseudo-diphth. bac. Gonococci in smears only.
28	? 1 mo.	Cured 6 mos.	—	
29	I. 1 yr.	P. G. U.	—	
30	I. 15 mos.	Cured 2 mos.	—	Bac. capsulatus mucosæ.
31	III. 1 week.	P. G. U. 10 mos.	—	Degeneration forms in plates. Cultures sterile.
32	I. 2 mos.	Cured 1 yr.	—	
33	I. 6 mos.	Cured 3 yrs.	—	
34	? 1 yr.	P. G. U.	+	

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TABLE II.

DIAGNOSIS BY BACTERIAL EXAMINATION.

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination	Bacteria found.
35	II. 2 mos.	Cure.	Staph. alb., strepto.
36	? 1 year.	P. G. U.	Staph. alb.
37	? 6 weeks.	Cured. Pus in prostate.	Staph. aureus.
38	II. 3 mos.	P. G. U.	Staph. alb. and aur. and strepto.
39	I. 2 mos.	Cure.	Staph. alb., aur. and strepto., proteus and pseudo-diphth. bac.
40	? 6 weeks.	Cure.	Bac. coli.
41	? 7 weeks.	Cure.	Staph. alb. and strepto.
42	II. 3 weeks.	Cure.	I. Staph. albus. and aureus. II. Staph. albus.
43	? 7 weeks.	Cure.	Staph. alb. and a small Gram-neg. bac.
44	? 3½ weeks.	Cure.	Strepto. mucosæ.
45	? 2 mos.	Cure.	Staph. alb. and strepto., pseudo-diphth. bac. and a small Gram-neg. extracellular coccus, not morphologically resembling gonococcus.
46	II. 3 weeks.	Cure—stricture.	Strepto., staph. aur. and pseudo-diphth. On smear one pair of gonococci (?).
46		11 wks. later.	I. Staph. alb., strepto. and pseudo-diphth. bac. II. No strepto.; otherwise same.
47	? 4 mos.	Cure.	Staph. alb.
48	? 2 weeks.	Cure, relapse a week later.	Staph. alb. and strepto.
49	II. 7 weeks.	P. G. U.	Staph. alb. gonococci.
49		2 wks. later.	Staph. alb. and strepto. and pseudo-diphth. bac. Some of the staph. are both Gram-pos. and Gram-neg. in culture.
50	? 6 mos.	P. G. U.	Bac. coli., staph. and gonococci (in smear).
50		1 mo. later.	Bac. coli., staph.
51	? 6 mos.	Cure.	I. Staph. alb., Gram-pos. bac. II. Sterile.
52	II. Brief.	Cure, 6 yrs.	Staph. alb., strepto.

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TABLE II.—*Continued.*

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination.	Bacteria found.
53	I. 4 mos.	Cure.	Staph. aureus, strepto., Gram-pos. bac.
	II. Brief.	Cure.	No examination.
	III. 2 mos.	Cure.	I. Staph. aureus.
			II. Same and gonococci (in smear).
		3 days later.	Same, except that gonococci appear only in culture.
		18 days later.	I. Staph. aureus and pseudo-diphth. bac.
			II. Staph. aureus. Degeneration forms.
54	? 1 yr.	P. G. U.	Staph. aur., strepto., and gonococci.
		19 days later.	Same, but gonococci only on smears of I.
55	? 4 mos.	P. G. U.	I. Staph. alb.
			II. Staph. alb. and gonococci by culture only.
		1 mo. later.	II. Staph. alb. and strepto.
			II. Staph. alb.
56	I. 3 yrs.	Urethrorrhea.	I. Staph. alb.
			II. Sterile.
57	? 5 yrs.	Cure.	Staph. alb., strepto. and pseudo-diphth. bac.
58	? Brief.	Cure 1 yr.	I. Strepto., pseudo-diphth. bac. and degeneration forms.
			II. Strepto., staph. alb. and degeneration forms.
59	? 3 mos.	Cure 3 mos.	Staph. aur., strepto.; gonococci in smears.
60	I. Brief.	Cure 18 mos.	Staph. alb., strepto.
61	I. Brief.	Cure 3 yrs.	Staph. alb., strepto. and pseudo-diphth. bacilli. In I. by smear a single cell containing gonococci. Also degeneration forms.
		7 weeks later.	I. Staph. alb. and pseudo-dipth. bac.
			II. Staph. alb.
		2 weeks later.	I. Staph. alb., strepto., pseudo-diphth. bac.
			II. Staph. alb., pseudo-diphth. bac.
62	I. Brief.	Cure, 6 yrs.	Staph. alb., strepto.
63	? 5 yrs.	Relapsing P. G. U.	I. Staph. alb., strepto. and intra-cellular degeneration forms (?) in smear.
			II. Staph. alb.

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TABLE II.—*Concluded.*

Case No.	No. of gons. and duration of present attack.	Clinical condition and date of subsequent examination.	Bacteria found.
63		11 days later.	Staph. alb.
64	? 3 yrs.	P. G. U.	I. Staph. alb. Staph. alb. and pseudo-diphth bac.
65	I. Brief.	Cure 10 mos.	Staph. alb. and strepto.
		1 week later.	Staph. alb.
		17 days later.	Staph. alb., strepto., pseudo-diphth. bac.
66	I. Several mos. well 3 yr.	P. G. U.	Staph. alb., strepto.
67	I. Several mos. well 3 yr.	Cured.	Sterile.
68	II. 3 weeks.	Cured.	Bac. prodigiosus and Gram-pos. cocci.
69	? Brief.	Cured 2 yrs.	Gram.-pos. cocci.
70	?		Staph. alb.
71	I. 6 mos.	Cure 1 mo.	Staph.
72	II. 3 mos.	Cure.	Staph. alb., diplococcus crassus.
		2 weeks later.	Same.
73	I. 6 mos.	Cure 1 yr.	Streptococcus mucosæ.
74	I. Brief.	Cure 3 yrs.	I. Staph. alb. II. Sterile.
75	III. 7 weeks.	Cure.	Staph. alb. and Gram-pos. bac.
76	? 8 yrs.	P. G. U.	Bac. coli. com.
77	I. 2 yrs.	P. G. U.	Staph. alb. and strepto.
78	No ga.	Simple ureth.	Pneumococci.
79	I. 1 yr.	Gonorrhœa.	Staph. alb., gonococci.
		1 mo. later cure.	Staph. alb. and strepto.
80	I. Few weeks.	Well 2 mos.	Staph. alb. Degeneration forms.
81	I. Few mos.	P. G. U.	Staph. alb., strepto. gonococci and unidentified bacilli.
		1 mo. later.	Gram.-pos. bacilli.
82	III. 6 weeks.	Cured.	Staph. alb., Gram-neg. bacilli.
83	?		Staph. alb., strepto., degeneration forms.
84	?		Strepto., pseudo-diphth. bac.
85	II. 3 mos.	Cure 4 mos.	I. Staph. alb., pseudo-diphth. bac. II. Sterile.
86	I. 3 mos.	Cure.	Staph. alb., pseudo-diphth. bac.

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DISCUSSION

OF PAPERS OF DRS. SWINBURNE, SCHMIDT AND KEYES.

DR. J. D. BARNEY of Boston: I should like to ask if the knowledge which this complement-fixation test has thrown on the subject offers, in any way, an explanation of the apparent and sometimes actual cure of gonorrhœa by the occurrence of epididymitis in the course of a urethritis?

DR. HUGH CABOT of Boston: I take it that others have been in the same difficulty that we have in being unable to obtain a satisfactory antigen. Perhaps Dr. Swinburne can tell us what probability there is that a satisfactory antigen can be readily obtained; that is, of course, the crux of the whole situation. It is impossible for a man to pick out these twelve separate strains and keep them, and for the test to become as widely used as is necessary to prove its value, we must be able to get this antigen.

DR. SWINBURNE: Dr. Schwarz and Dr. McNeil of the Board of Health have been working all summer to find an antigen that will last. I am delighted to hear what Dr. Schmidt says of the antigen sent him by Parke, Davis & Co., that is lasting so long and yielding such satisfactory results. It seems to me to be very satisfactory indeed, because I think that soon we will have an antigen that will last and be a commercial article. I am sorry that I am so little familiar with the test itself. I have never tested the blood in any of these cases, and I do not know anything about the technique. I have to rely on the laboratory men. I do not think I quite understand Dr. Barney's question.

DR. BARNEY: During the course of a gonorrhœa I think we all have seen the urethritis cease, either absolutely or practically so, on the occurrence of an epididymitis, and I want to know whether this new test will throw any new light on the explanation of that subject.

DR. SWINBURNE: I had one case, a boy, who came to the dispensary two or three years after his first attack of gonorrhœa, which was cured, he said, in about six weeks. Of course, I do

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not know what his condition was during that time, but he appeared with an epididymitis, and his blood was positive, and it seems to me that this test does throw light on that subject; but the question of whether the blood will be negative at one time and then afterwards become positive, I have not had any case that shows that, except cases where there was a distinct reinfection. There was one point that I wanted very much to clear up and tried to — that was, whether the giving of the serum or the bacterins would prove, for instance, in cases who have never had gonorrhœa, or in whom afterwards the blood was positive — whether the giving of these bacterins would give a positive reaction to the blood. I have had two cases now. One of them is a physician living in Canada. He wrote me just before I left on my vacation that he had had I don't know how many millions of bacterins injected almost every other day for months, and his blood gave a negative reaction. Another case that I had treated myself for some time had gonococci in December. He was married in February. During the month of January I gave him bacterins, five millions every other day, for several weeks, and in March his blood was negative.

DR. B. C. CORBUS of Chicago: I think I can answer in part the question asked by Dr. Swinburne. Some time ago, in experimenting on monkeys with reference to syphilis, the antigen was injected into the monkeys. They found they got a positive test, but they were able also to inoculate these monkeys with syphilis. Of course, we all know that antigens or any substance injected into the body causes the formation of the same antibody.

DR. KEYES: If I may have the privilege of adding my personal experience to the last remarks. I too was interested to find a victim who was willing to submit to injections of gonococcus bacterins without having a gonorrhœa, and was unable to find anybody excepting myself. So I had my own blood tested, and it proved to be negative. I then took injections of bacterins (Parke, Davis's), twenty million; a week later forty million, a week later fifty million, a week later sixty million; and the week after that my blood showed the same negative reaction that I had started with.

DR. SCHMIDT: This culture medium that I referred to is something that Dr. Carl Warden has brought into use, and it is at the present time the best medium that I know of as regards the growing of the gonococcus. If you make a transplatation

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from a patient today, by tomorrow there is a luxuriant growth, and at the end of two or three weeks there is a jellatinous-like mass which consists of gonococci. I believe he has transplanted over one hundred times on this medium, and in the course of four or five transplantations he has noted that the growth can be transplanted to blood-sugar and other media, and again be transplanted over to this medium of his, and the gonococcus remains apparently as active as originally. So I am under the impression that it will be a step in advance, and will certainly come into play as far as the practicability of this test is concerned.

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PRIMARY SARCOMA OF THE MALE URETHRA. REPORT OF A CASE.

ERNEST G. MARK,
KANSAS CITY, MO.

The occurrence of sarcoma in the urethra is most unusual, and its appearance as a primary growth in the male urethra is not recorded in the literature. To quote from a monograph by the writer, dealing with new growths of the urethra and presented before the 1908 meeting of this Association: —

"To Hoening (Berlin Klin. Wochenschrift, 1869, page 55) belongs the credit for the first reported case. Rizzoli (Jour. de med. de Bruxelles, 1875), Tillaux (Annals de gynecologie, 1889), Buttner (Zeitschrift für Gyneak, Bd. XVIII, page 122), Ehrendorfer (Centralblatt für Gyneak, 1892), Lejars (Leçons de Chirurgie) and Albarran have all reported well-authenticated cases of fibro-sarcoma. Hall and Frick (Jour. A. M. A., June 23, 1906) record a case of melanotic sarcoma which they assume from the post-mortem findings must have originated in the urethra. The case is unique but the clinical evidence is well supported.

Legueu makes the statement based on his investigations that sarcoma occurs exclusively in the adult female. In the case reported by Hall and Frick, the patient was a male, thirty-three years of age.

Fibro-sarcomata of the urethra pursue the same indolent course that characterizes their growth in other parts of the body. Their appearance is in no

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way typical and their clinical differential diagnosis from fibromata is almost impossible.

The case report of the patient observed by the writer follows: —

C. R., age twenty-four, Hereford, Texas; occupation, automobile mechanic, referred by Dr. J. D. Griffith. Family history negative. Seven or eight years ago while on a ranch and out of reach of medical attention, he had an attack of what was apparently, from the history given, acute appendicitis, followed by a generalized peritonitis, from which he recovered without apparent sequelæ. In March, 1910, he was operated for an inguinal hernia. For some two or three weeks previous to operation he had noticed a slight burning or smarting in the pendulous portion of the urethra. After operation he was allowed no water to drink for a few days and micturition caused pronounced burning in the urethra. On palpation of the penis a small lump or hardened, thickened spot was discoverable about one inch posterior to the glans penis, in the spongy body. This was diagnosed without urethroscopy as an ulcer in the urethra, and hand injections given. These injections caused the urethra to become inflamed. The thickened portion extended gradually backwards. The patient described it as feeling like a ridge, getting smaller both proximally and distally. There was very little pain or discomfort except on urination. Up to four or five months before presenting himself for treatment, no obstruction to the stream was noticed. Pollakiuria had been gradually increasing. At the time of entering hospital there was a very small stream with accompanying dysuria. From the first there had been a serous discharge from the meatus, which gradually increased and became serosanguineous. For about six weeks previous to examination slight

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terminal hematuria was noticed. He had apparently lost none in weight and appeared well nourished.

Examination: Abdomen negative. Thorax negative. Examination of the genitals revealed a fairly hard elongated mass, palpable from just posterior to the glans back through the scrotal urethra. This mass showed a decided tendency to become turgescent and much harder on handling, without accompanying turgescence of the cavernous bodies. A slight serosanguineous discharge presented at the meatus. The scrotum and contents were normal. The prostate was small and showed no evidence of nodulation. Vesicles normal. No. 10 F. bougie à boule was passed with difficulty from the mid-pendulous portion.

Urethroscopy: No. 24 F. tube met obstruction just posterior to the corona. Under air inflation, very pale polypoid masses, irregular in outline, were observed, springing from the entire urethral circumference. Using the urethroscopic tube as a curette these masses were removed with great difficulty as far back as the scrotal urethra. On account of the bleeding and the duration of the operative procedure it was deemed advisable to postpone any further measures. The masses thus removed were left at the hospital for pathological examination, which somehow was neglected. Six days later the work was taken up where it had been left off, and utilizing the same procedure as at the former operation, the remaining growths or portions of the growth were removed back to the anterior layer of the triangular ligament.

A cystoscope was now introduced without difficulty and examination revealed a high-grade cystitis, but no evidence of new growth. The bladder capacity was much diminished. Suprapubic drainage was instituted and regular soundings done. On account of the pronounced tendency of the growth to recur and the knowledge of its real character, this drain-

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age was made permanent. The patient refused radical interference and left the hospital about six weeks later. At the time of leaving the hospital, the growth was rapidly recurring. The specimens removed were submitted to Dr. Frank J. Hall, whose report follows: —

"Gross specimen consists of a number of whitish soft fragments. Section shows sarcoma poor in blood vessels, with small amount of stroma. The cells are of the large round type, with a suggestion of polymorphous cells with vesicular nuclei and pinkish staining cytoplasm. (Frozen section. H. and E. stain.)"

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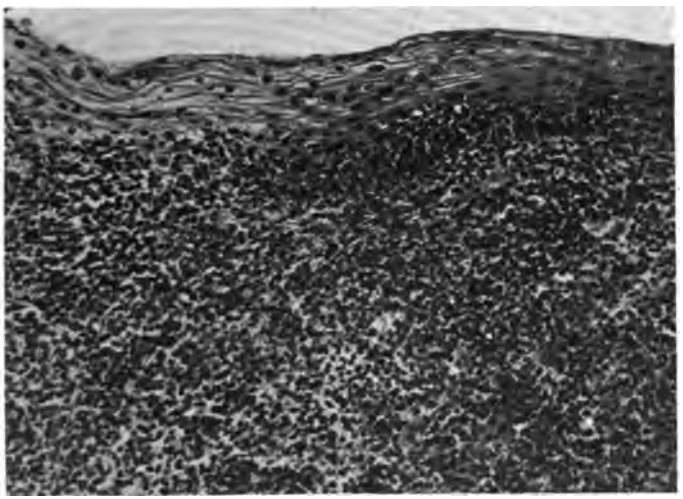

SARCOMA OF MALE URETHRA.

Dr. Mark's Case. C. R., age, 24, Hereford, Tex.

Photomicrograph showing invasion of tumor cells to urethral mucosa. (Frozen section, H. and E. stain.) (Zeiss obj. "A," no ocular.)

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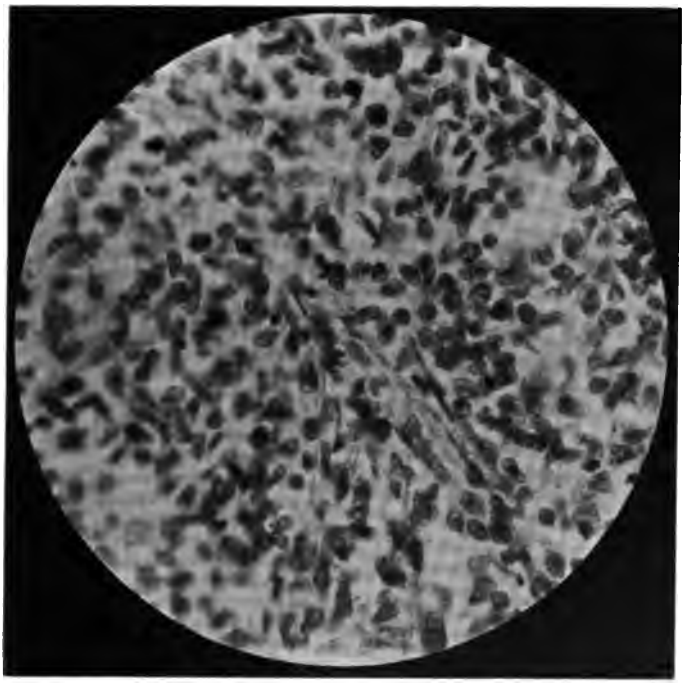

SARCOMA OF MALE URETHRA.

Dr. Mark's Case. C. R., age 24, Hereford, Tex.

Photomicrograph showing higher magnification of tumor cells and connective tissue. (Frozen section, H. and E. stain.) (Zeiss obj. "D," no ocular.)

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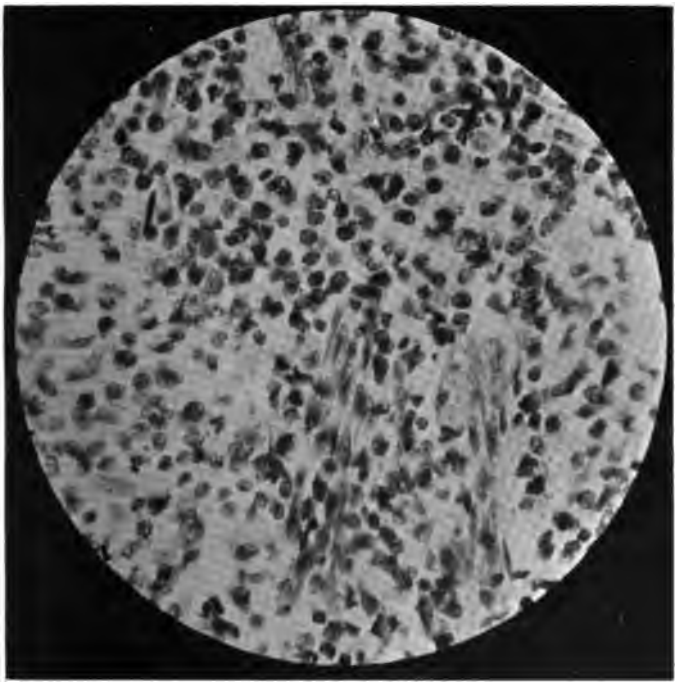

SARCOMA OF MALE URETHRA.

Dr. Mark's Case. C. R., age 24, Hereford, Tex.

Photomicrograph showing character of tumor cells and connective tissue. (Frozen section, H. and E. stain.) (Zeiss obj. "D," no ocular.)

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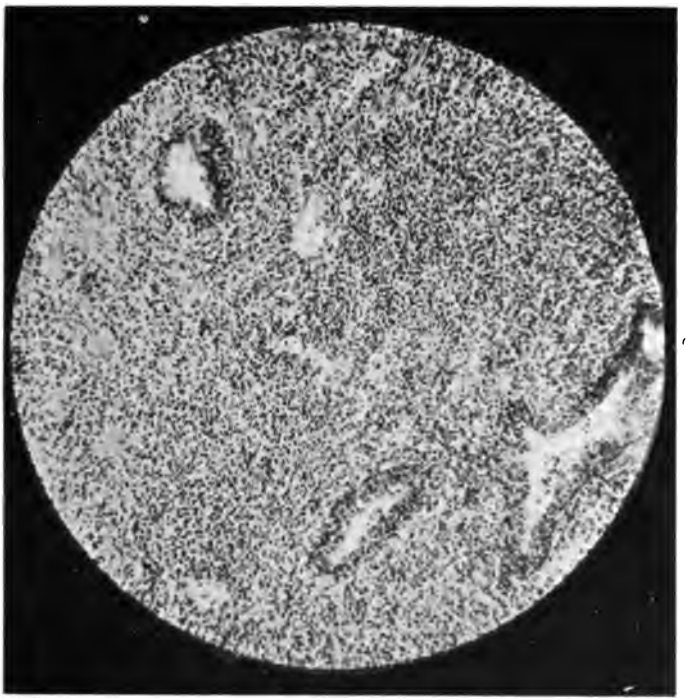

SARCOMA OF MALE URETHRA.

Dr. Mark's Case. C. R., Age 24, Hereford, Texas.

Photomicrograph, showing sarcoma cells, connective tissue, and relation to glands. (Frozen section, H. and E. stain.) (Zeiss obj. "A," no ocular.)

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EXPERIENCES WITH A VACCINE IN THE TREATMENT OF CHANCROIDS.

ROBERT H. HERBST AND L. C. GATEWOOD,
CHICAGO, ILL.

This work was begun in the belief that the bacillus chancri mollis, or Ducrey bacillus, as it is more commonly called, was the most important etiological factor in the production of chancroids, and that vaccines prepared from this organism might be of value in the treatment of these lesions. With this in view, attempts were made to obtain the organism in pure culture from chancroids seen in the clinic at the Rush Medical College. Up to the present time we have been unsuccessful in this attempt, although we have examined bacteriologically a considerable number of cases and have obtained some results which we believe are worthy of report.

The blood agar media which we have used in this work is prepared by melting plain agar, cooling it in a water bath to 45° C., and adding fresh, sterile, defibrinated human blood. The amount of blood used depends upon the organisms to be grown upon the media, and varies from ten drops per agar slant tube to an amount equal to one-half of the amount of agar used. The tube is shaken until the blood is thoroughly mixed with the agar, and it may then be inoculated and poured into petri dishes, as in the ordinary method of isolating organisms by plating, or it may be cooled as a blood agar slant tube. In making the cultures the first inoculation is made directly from the surface of the chancroid, and the

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lesion is then washed with sterile salt solution to remove the débris and surface organisms which are usually of no etiological importance. The floor of the ulcer is scraped with a stiff platinum loop, and blood agar plates are inoculated with the material obtained in this way. In our first work, owing to the inadequate facilities for bacteriological work in the clinic, we made our cultures from the lesions upon blood agar slant tubes, and where more than one organism was found in smears from the lesions or from the cultures thus made, plates were inoculated from these cultures to isolate the various organisms present. The organisms, having been isolated either by plating directly from the lesions or from slant cultures, are next identified by their staining properties and their morphological and cultural characteristics, and vaccines are prepared from pure cultures of these organisms. Human blood agar slants, prepared as described above, are incubated for twenty-four hours to prove their sterility. The water of condensation is then pipetted off with a sterile Pasteur pipette and the tubes are inoculated with the various organisms in about the same proportions as they occurred in the original cultures. Thus if, for example, there were forty colonies of organism "A" and twenty colonies of organism "B" on the original plate, we use twice as many pure cultures of organism "A" as of organism "B" in the preparation of our vaccine. This method, it will be understood, is purely arbitrary, and has been adopted only until the time when the etiological importance of the various organisms shall have been more completely worked out. The cultures are incubated for twenty-four hours at 37° C. and the growth is washed down with a small amount of sterile isotonic salt solution. The bacterial suspensions thus obtained are pipetted off into a sterile flask, shaken well to insure the break-

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ing up of all of the clumps of bacteria and the thorough mixture of all of the suspensions used, and then heated to kill the bacteria.

The method recommended by Wright and generally used in vaccine laboratories is to heat the bacterial suspension to a temperature of 56° C. for a period of from thirty minutes to one hour, depending upon the length of time required to kill the organisms, and our first vaccines were prepared in this way by heating in the thermostat for one hour at 56° C. By a few experiments, however, we found that the bacteria could be killed at lower temperatures, and this was believed to be very desirable. It has been shown that different proteins have different coagulation points, just as different liquids have different boiling points, and that mixtures of solutions of various proteins undergo a fractional coagulation, as the temperature of the mixture is gradually raised from 40° C. to 60° C., very much as liquids undergo fractional distillation under similar circumstances. Therefore, we believe that by using a lower temperature more of the bacterial cell proteins will remain in solution, and a more potent vaccine should be obtained. To insure the death of all of the bacteria at the lower temperature, it is necessary to heat for a longer time, and our vaccines are now prepared by heating for twelve hours at 50° C. At the end of this time a blood agar plate is inoculated with one c.c. of the heated suspension, to prove that all of the organisms are dead. If any colonies develop on this plate, the suspension is heated for four hours at 52° C., and again tested, and in every case this has been sufficient to kill all of the bacteria. As soon as the suspension has been proven sterile the number of bacteria per cubic centimeter is determined by the Wright method and by counting the bacteria with the ordinary blood corpuscle counting apparatus. The suspension is

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then diluted with sterile isotonic salt solution to the desired strength, usually about 200,000,000 bacteria per cubic centimeter, and preserved with 0.5 per cent phenol.

We are prepared at the present time to report the complete bacteriological examination and preparation of vaccines from twenty typical clinical cases of chancroids. In this entire series we have found only two strains of organisms which could possibly be the so-called bacillus of Ducrey. In the first instance we found a small polar-staining, Gram-negative bacillus in a culture which also contained staphylococcus pyogenes albus. This bacillus would not grow on ordinary media, and but very scantily on blood agar, and because of the rapid growth of the staphylococcus with which it was contaminated it could not be obtained in pure culture and very quickly died out. In so far as we were able to observe it in mixed culture, it corresponded in every way with the bacillus chancri mollis. From another case we obtained in pure culture an organism which corresponded in size, appearance and staining properties with bacillus chancri mollis, and grew only upon blood agar, but even there its growth was very scanty and it died out very quickly. In the plates from which this organism was obtained we also found the micrococcus tetragenes and a spore-forming saprophytic bacillus.

From eight of our cases we isolated bacilli of the diphtheria group, the so-called pseudo-diphtheria bacilli. A word of explanation may be necessary in regard to this terminology, as the text-books in common use are not very clear on the nomenclature of the organisms of this group, and describe the bacillus pseudo-diphtheriac as a non-pathogenic organism of the diphtheria group. The recent work upon this group of bacteria, however, has shown that the morphological differences between the true diphtheria and

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the pseudo-diphtheria bacilli are not so constant as they were formerly believed to be, and that many of the pseudo-diphtheria forms are distinctly pathogenic. According to the more recent views, the differentiation between the true diphtheria and the pseudo-diphtheria organisms is based upon tests of toxin formation and upon the protection of experimental animals with diphtheria antitoxin against the pathogenic effects of injections of the bacteria to be tested. All of those members of the group which do not form toxin and against which antitoxin does not protect are placed in the class of pseudo-diphtheria organisms and this class thus contains organisms of widely different characteristics, as regards size, shape, growth upon media, pathogenesis, etc. Some are large, while some are quite small; some grow very abundantly and some grow very scantily, while some grow only upon blood media. As a rule, they are Gram-positive, but some strains are Gram-negative. Polar staining is fairly constant, as is also the tendency of the organisms to assume the parallel arrangement, the so-called palisade or Chinese house grouping so valuable in diagnosis. Strains of bacillus pseudo-diphtheriæ may thus present the various characteristics of the bacillus chancri mollis, and so far as we have been able to learn from our work or from the work of others, it seems probable that the bacillus chancri mollis may be a member of the diphtheria group, although this point has not yet been proven because of the difficulty of obtaining the organism. We hope soon to be able to present further data upon this point. Non-pathogenic strains of bacillus pseudo-diphtheriæ are comparatively common in the urinary tract and pathogenic forms are occasionally found, cases of cystitis due to this organism having been reported and abscesses having been produced in guinea pigs by injections of organisms from this

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source. This has led us to believe that the strains of bacillus pseudo-diphtheriæ which we have isolated from chancroids were the important etiological factor in the production of those lesions. We are now injecting suspensions of this organism in normal salt solution into the subcutaneous tissue of the abdominal wall of normal healthy guinea pigs, and by such injections we have produced marked local inflammatory reactions, persisting over a period of ten days from the time of the injection, and gradually subsiding. This reaction is sufficient to prove that we are dealing with pathogenic strains of the pseudo-diphtheria group. In one instance we have succeeded in producing a lesion showing all the characteristics of a typical chancroid, with enlargement of the axillary glands. This lesion developed on the fourth day after the inoculation was made. We have further succeeded in recovering from this lesion and growing in pure culture a bacillus identical to the one used for inoculation. As far as we know, this is the first successful animal inoculation that has been made other than in the monkey.

Among the other organisms which we have found are the staphylococcus pyogenes albus, occurring in fourteen cases; the staphylococcus pyogenes aureus, occurring in eight cases; the micrococcus tetragenes, in two cases, and the streptococcus pyogenes, in two cases, in one of which it occurred almost in pure culture. A spore-forming saprophytic bacillus, probably bacillus subtilis, although not definitely identified, was found in four cases in cultures made from the purulent or necrotic material in the floor of the ulcer. It was non-pathogenic and of no etiological importance, and was not used in the preparation of the vaccines, because it would be impossible to kill the spores without using temperatures which would so change the composition of the bacterial cell as to

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render it of no value for a vaccine. In three of our cases we were unable to obtain any growth or to obtain any organisms in smears. These three cases were all of considerable duration at the time when they were first seen and the inoculations made and it is thought probable that the organisms which gave rise to the pathological process had become so few in number and so deeply situated that they could no longer be recovered by ordinary methods. We were unable to obtain the patients for subsequent inoculations. In another similar case the only organism found in the first inoculation was a large spore-forming saprophytic bacillus, probably bacillus subtilis. Three weeks later plates were again inoculated and gave cultures of staphylococcus pyogenes albus and aureus, whereas the saprophyte had disappeared from the lesions.

Thirty-two cases have been treated with these vaccines. Of this number, five patients deserted the clinic after the first or second injection, which necessarily has not given us sufficient time to draw any adequate conclusions. We also must add at this time that, in order to keep control over our patients, some local treatment was essential. We used a weak watery solution of methylene blue applied in the form of a small compress.

Eliminating the five cases mentioned above, we have remaining in our present series twenty-seven cases to report. These were all selected clinical cases of chancroids. In most instances bacteriological examinations were made, a large percentage of which showed a bacillus which evidently belongs to the pseudo-diphtheria group, with a contamination of staphylococci.

Differentiation from syphilis was effected by a systematic search for spirochetes in the early cases. In the cases of long standing a Wassermann test was

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made. This practically limited our cases to those of pure chancroids.

The vaccines were administered by subcutaneous injection into the abdominal wall. Little or no reaction followed these injections. In a few cases a slight redness appeared and a slight tenderness at the site of injection, both usually disappearing in twenty-four hours. We have not observed the slightest constitutional disturbance following the injections.

Our dosage ranged from 50,000,000 to 400,000,000, using from one to two c.c. for each injection. In our early work we limited the injections to one a week; later on we increased this to two a week, and in one instance we even gave an injection on ten consecutive days, with no bad effects whatever, and a decided improvement in the local condition. Of the twenty-seven cases cited above, we obtained an absolute cure in eight, the time varying from five days to three weeks. In seven others we noted a decided improvement following the injections, although we cannot conscientiously ascribe the result to the vaccine, because either the time required was too long or the healing of the ulcers incomplete. Some of the latter are still under treatment.

At first blush these results may not seem in any way encouraging. We must bear in mind, however, that in the early cases a stock vaccine was used, which contained an organism, in small number, supposed to be the Ducrey bacillus, and a strong contamination of staphylococci. Later on a vaccine composed largely of a bacillus belonging to the pseudo-diphtheria group, together with a small number of staphylococci, was used, with far better results. The following case serves as a good example: —

P. O., twenty-eight years of age, entered the genito-urinary clinic at Rush Medical College on March 6, 1911. Previous history negative. Present

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history: Five days after exposure he noticed a small lesion on the under surface of his prepuce, near the frenum, which grew rapidly in size. Upon examination this lesion was found to be 3 mm. in diameter. The ulcer was treated locally for two months, without any sign of improvement.

On May 6 he was given his first injection of vaccine; our original stock vaccine being used. This was repeated weekly for some time, during which period a new ulcer and a bubo developed, the old ulcer continually increasing in size. From these lesions we made a culture and obtained therefrom an almost pure growth of pseudo-diphtheria, with a slight contamination of staphylococcus albus. A vaccine was prepared from this culture and administered twice a week for two weeks. At the end of this period the lesions had entirely healed and all that remained of the bubo was a small hard gland about the size of a bean.

Since observing this case, we have used either the pseudo-diphtheria and staphylococcus as a stock vaccine, or an autogenous vaccine, and our results have been markedly better. The following case is a striking example of a rapid cure:—

R. M., aged twenty-two; entered the clinic in the early part of June. Eight weeks before he noticed three ulcers on his penis, one on the glans penis and two on the under surface of the prepuce, one located near the frenum. The prepuce was edematous and partly phimosed, discharging a large quantity of foul-smelling pus. He had been treated locally for eight weeks, during which time this condition became worse. On June 5 he was given thirty minims of our pseudo-diphtheria stock vaccine, containing 200,000,000 to the c.c. He reported that the day following the injection there developed a painful area, extending from the site of the injection to the in-

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guinal glands of that side. He also stated that this area was very red. This disappeared in twenty-four hours. On the third day after the injection was given he appeared at the clinic showing the following condition: The phimosis had entirely subsided and the three lesions were almost healed. Two days later, on the fifth day after the injection, Dr. Belfield demonstrated him before the Alumni Association of Rush Medical College, and by this time the lesions had entirely healed.

This being entirely in the nature of a preliminary report, we cannot draw any positive conclusions. We do feel, however, that the following points may be considered: —

(1) That in a majority of the cases we have found an organism belonging to the pseudo-diphtheria group, in some instances almost in pure culture.

(2) That a bacillus, non-pathogenic, belonging to this group, and morphologically identical to what we have found, is commonly present in the urinary tract and on the genitalia.

(3) Clinically, we rarely see chancroids upon clean individuals, while in dispensary practice they are very common. In other words, filth seems to play an important role as an etiological factor.

Taking these three points into consideration, is it not possible that the condition (so long described as Ducrey's disease, and presumably due to a specific organism called the Ducrey bacillus) is in reality an infection due to a bacillus belonging to the pseudo-diphtheria group, which has been changed from a non-pathogenic germ to one that is pathogenic through the presence of filth?

Our results show a trifle less than thirty per cent cures, and at first sight could hardly be considered in any way conclusive. We have included in this series of twenty-seven cases all our early ones, in the

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treatment of which we had evidently erred in using a non-potent vaccine. However, we trust that further experimentation along these lines will insure a greater success than we heretofore have attained.

DISCUSSION

OF PAPERS OF DRS. MARK AND HERBST.

DR. H. J. SCHERCK of St. Louis: Speaking of Dr. Mark's paper, I had occasion to see the specimen about a year ago, and I looked over the literature of the subject very carefully, and can confirm Dr. Mark's statement that primary sarcoma of the urethra is unreported, and if his case is one of primary sarcoma it is the only case of the kind in medical literature. After listening to the report of the case this morning there are certain points that are not as clear as I should like. In the first place, it was about a year ago that the case was reported. If I understood the doctor, it had the appearance of a multiple papilloma, that is, it resembled papilloma with this difference, that it became more proliferative as it extended toward the bladder neck, contrary to the usual condition that we find in ordinary papillomata of the urethra. Sarcoma being unreported and so extremely rare, a multiple sarcoma of that type, resembling papillomata, would be even more rare. The doctor does not make any reference to enlargement of the glands. By this time involvement of the glands should be present, and we would expect return with further obstruction of the canal. Besides that we have to guide us in the diagnosis solely the pathological report. Now, I have had on more than one occasion mistakes made by very excellent pathologists in regard to sarcomata, particularly the round-celled variety. So that, while I am not doubting completely the report of this case, I think that we ought to look into it and consider it more thoroughly before we adopt it as positively a case of primary sarcoma. Personally I have seen one or two cases of primary sarcoma of the penis, and very recently had a patient with a large primary sarcoma involving the whole glans. But a multiple sarcomatous condition of the urethra is so rare that I only suggest these objections to bring out a further discussion and more complete details of this very interesting case.

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DR. W. W. TOWNSEND of Rutland: I should like to say in connection with Dr. Herbst's paper, that I have recently had some experience with the pseudo-diphtheria bacillus, having met with it in a case of pyelonephritis of the right kidney and recovered the organism from the urine drawn by ureter catheter and from a slough, which was passed per urethram. I submitted the urine and the slough to the laboratory, for the purpose of determining whether or no the condition was a tuberculous one, and animal inoculation and examination of the smear were negative. At that time we discovered that we had to deal with the pseudo-diphtheria bacillus. In looking over the literature at my command I could find no reference to its recovery from this source, and being interested, I had our State Pathologist grow the organism and ascertain its pathogenesis. I also sent specimens to Dr. Perry of Harvard, for the same purpose. These gentlemen carried on their investigations absolutely independent of each other and submitted to me similar reports, which in brief were that the organism was non-pathogenic to guinea pigs.

DR. LEO BUERGER of New York: In discussing Dr. Herbst's paper, I should like to call attention to the fact, known by most bacteriologists, that in the eye and in the urethra the pseudo-diphtheria bacillus is very common, and I do not think that we ought to take it for granted that because this particular bacillus was found with such regularity in the doctor's case, it is the same as the Ducrey bacillus, or that it can cause a chancroid. Furthermore, one must be very careful about relying upon the facts that we get from the inoculation of animals. Some seven years ago, whilst engaged in an investigation of the pneumococcus for the Pneumonia Commission of New York, experiments with the streptococcus demonstrated conclusively that guinea pigs injected subcutaneously with it may develop ulcerative and chancroidal lesions. I have found the pseudo-diphtheria bacillus very frequent in the normal urethra. If you make cultures of the drippings after massage of the prostate directly on serum agar petri plates in a routine way, as is my custom, you will cultivate the pseudo-diphtheria bacillus in a great many cases. It is interesting, though, to know that this bacillus when injected in the form of vaccine may aid in the cure of a soft chancre.

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DR. MARK: I anticipated the question arising here of the possibility of this not being a sarcoma, and I am sorry that I neglected to state that specimens were submitted for section to Ann Arbor, some sent to Philadelphia, and I think some to Boston. All the reports agreed, and also I have got these microphotographs as a little bit more evidence in the case. I realize that this case is unique, and I realize also that in the handling of the case the procedures undertaken were absolutely idiotic. When I first saw the case, on account of the practical nonexistence in the literature of primary sarcoma of the urethra, I did not suspect for one second that it was a malignant growth. On introducing the urethroscope the growths did not appear papillomatous; they appeared more polypoid. We know that in removing papillomata from the urethra it is very easy to scrape off the base. These were extremely hard to remove. Of course, total extirpation should have been done. There was at that time no glandular involvement. There was a decided tendency to recurrence of the growth.

DR. R. H. HERBST (closing the discussion): Answering Dr. Buerger's question as to the pathogenic properties of the pseudodiphtheria bacillus, I may say that Dr. D. J. Davis of Chicago has shown that under certain conditions these germs are pathogenic. We have not made the claim that a germ belonging to the pseudo-diphtheria group is the cause of chancroids, but merely called attention to the fact that we have frequently found them in pure culture both from the lesions and the resulting buboes.

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PREPUCIAL REDUNDANCY. AN OPERATIVE TECHNIQUE FOR ITS CORRECTION.

WILLIAM WARREN TOWNSEND,
RUTLAND, VERMONT.

It is not the purpose of this paper to discuss the subject of phimosis, nor is the technique to be described recommended in congenital or acquired phimosis. A review of the works on surgery relative to pathologic conditions of the prepuce, except in connection with phimosis, discloses the fact that little reference is made to a class of cases in which there is marked redundancy of tissue, and wherein, owing to the size of the prepucial orifice, it is perfectly possible to retract the foreskin over the glans into the coronal sulcus. This type of case is well shown in Fig. 1, and aside from cases of congenital phimosis, it is this type that comes most frequently to operation. Where reference is made to this condition, the orthodox operation of circumcision, with its usual technique, consisting of the removal of both layers of the prepuce, is advised; and it is recommended by most authors to ablate the inner layer to within a fraction of an inch of the corona. When as little tissue as that is left the contraction following healing leaves the corona and the glans without protection — which is contrary to what nature intended, if any conclusions are to be drawn from observations that have been made.

Some authors sound a note of warning regarding the removal of too much foreskin, but only in connection with its interfering with erection; hence in the operation of circumcision for phimosis and in per-

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forming it for redundancy, the question naturally suggesting itself is: How much foreskin is it anatomically correct to remove? Each individual operator decides this point arbitrarily. This is not to be wondered at, as there is no anatomical standard that we have been able to find, that governs the length of a normal prepuce. Anatomists describing it are brief and ambiguous; for example, to quote from Gerrish, who says: "Just behind the cervix the integument leaves the surface of the penis and is continued forward for a varying distance, forming the outer layer of the prepuce; then it turns backward within itself, forming the inner layer and rejoins the surface at the level of the cervix."

From this quotation and other descriptions reviewed, and from our observations, it is evident that nature intended that some covering should protect the sensitive nerve papillæ in the mucosa covering of the glans and corona. Just how much of the glans nature intended to protect we have tried to determine, and it was with a view of gaining some definite knowledge as to the average length of the prepuce that we inaugurated a practice of observing, in the course of the routine physical examinations of prisoners in a penitentiary in which I have a service, the length of the foreskins of the uncircumcised, and classified them as follows: —

Type A. Those in which the skin of the shaft of the penis joined the mucous membrane at the cervix, thus affording no covering whatsoever to the glans; as *Cervical.*

Type B. Those in which the prepuce covered the corona and part of the glans when the organ was in the flaccid state; as *Semi-Protective.*

Type C. Those in which the prepuce covered all of the glans, but allowed a view of the meatus and tip of the summit through the prepucial orifice, which

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was large and distensible enough to permit of a retraction of it into the coronal sulcus; as *Protective.*

Type D. Those cases in which there was a quarter of an inch or more of puckered, redundant tissue projecting beyond the tip of the glans and a prepucial orifice sufficiently large to slip over the glans into the coronal sulcus, but when retracted would bunch up into a muco-cutaneous collar; as *Redundant.*

Type E. Those cases in which conditions were as described in Types C and D, but in which retraction was impossible, typical cases of congenital phimosis; as *Phimotic.*

We made these observations in a series of two thousand adult examinations, with the following results: —

Type A.	163	cases.
Type B.	510	"
Type C.	880	"
Type D.	420	"
Type E.	27	"

or 1,810 instances in the two thousand observations in which the glans were protected when the penis was flaccid.

From these observations our conclusions were that nature, in her effort to protect the sensitive nerve endings in the mucous membrane of the glans, provided such a covering that when the penis was flaccid it afforded full protection, and when the organ became erect and the glans engorged, the prepuce slipped back into the coronal sulcus and was on a plane with the skin covering the shaft of the organ and left the sensitive nerve terminals of the glans exposed and acute to receive the stimulus necessary to consummate the sexual act.

This supposition is rather strengthened when the anatomy of the prepuce and penis of the lower animals

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is studied. It would also seem that the coronal sulcus was by nature placed so as to receive, during the turgidity of the penis, the foreskin which had so well protected the highly elaborated nerve terminii from friction of the wearing apparel when the penis was in the flaccid state.

Hutchinson long ago pointed out the fact that in circumcised individuals "the integument of the glans became of a horny character." From the standpoint of prophylaxis we can appreciate wherein the hornified epithelium, as suggested by Hutchinson, becomes hard to inoculate with spirochetæ and pyogenic organisms, and in that way affords a certain amount of immunity to the promiscuous; but does not the hornified and less sensitized epithelium bear some relation to the complaints of individuals who come to us for relief from feeble erections and inability to complete the sexual act by orgasm?

We have no records to prove or disprove this hypothesis, but offer it simply as a possible etiological factor to be studied in cases of this description.

It is not within the scope of my title to discuss the indications for circumcision or for the technique I describe, but in conditions of redundancy *per se*, it has proven a most satisfactory method of correction, when for pathological conditions it was indicated.

Von Zeissl, in 1883, suggested and published an operation for para-phimosis; and Klotz, in 1902, published a method of circumcision applicable to cases of congenital and acquired phimosis. Both advised in their publications the preservation of the inner layer of the prepuce, and as far as I can ascertain, these gentlemen are the only ones who have published techniques which serve to shorten the sheath of the penis by resecting rather than by amputation, as is done in the method I beg to commend and which is as follows: —

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Technique. The patient is prepared as for any ordinary circumcision; a constrictor is applied at the root of the shaft and an estimation of the amount of superfluous prepuce is made and the amount it is to be shortened is determined by retracing it so that the perpetual orifice lies anterior to and midway between the tip of the glans and corona. This manipulation will cause the redundancy of prepuce to roll up behind the corona. Into the middle of this roll inject the selected local anæsthetic and repeat the injection at a point corresponding to the superior injection, on the inferior side at the raphe, which is usually in the middle. The object of anæsthetizing these two areas being, that when they are picked up by the artery clamps (Fig. 2) there will be no pain experienced. The clamps are then drawn forward and thus invaginate the prepucial orificial ring.

An ordinary circumcision clamp or medium-sized pedicle clamp is then applied, so that the invaginated ring is behind it (Fig. 3). The cutaneous tissue lying in front of the clamp is infiltrated with the anæsthetic in the usual way, and the redundancy amputated with a scalpel or scissors close to the clamp. When the clamp is removed it will at once be observed that a section of integument has been resected, leaving the under layer of mucous membrane, the loose areola tissue and blood vessels that lie between the layers, and a collar of skin uncut (Fig. 4).

The skin retracts on the shaft and the collar is drawn back so that the cut edges of it and the retracted skin are brought into apposition and held there by long guy sutures, which are later used to hold on the turban gauze dressing. It will be found necessary to hold the edges in closer apposition than is done in a muco-cutaneous suture line, as the skin shows a tendency to retract and pucker, so that more interrupted sutures are necessary than is customary.

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Fig. 1. — Type E.

Showing a long puckered prepuce, but with an orifice large enough to allow of its retraction into the coronal sulcus, forming a muco-cutaneous roll therein; "a misfit."

Fig. 2.

Showing the position of the artery clamps after picking up an esthetized area of skin in the midline of the upper and lower sides of the muco-cutaneous roll with the prepuce drawn forward so as to cover the glans.

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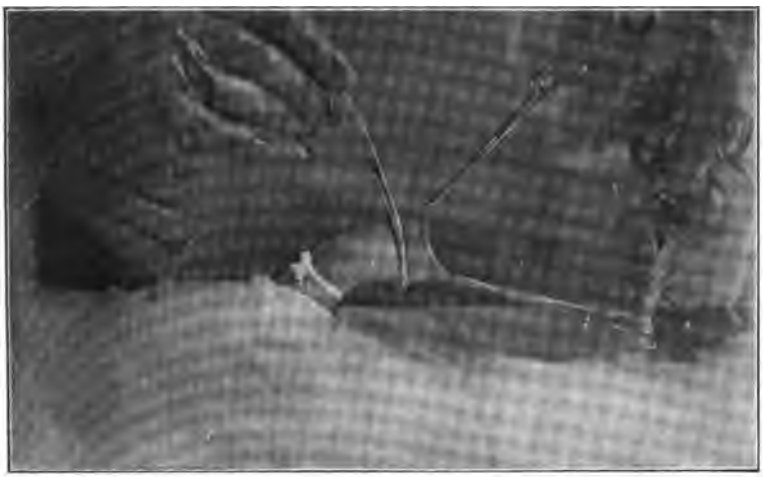

Fig. 3.

Showing the artery clamps drawn forward invaginating the preputial orifice. The circumcision clamp when applied is in front of the orificial ring.

Fig. 4.

Showing the cutaneous collar attached to the under layer which remains uncut when the section of skin is resected.

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Fig. 5.

Showing the eversion of the mucous membrane that occurs when the collar is drawn back to be sutured to the retracted skin of the sheath.

Fig. 6.
Showing the suture line.

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Fig. 7.

Showing suture line fifteen days after operation. The prepuce is retracted into the coronal sulcus where it "fits." It will also be noted that the suture line is away from possible chance of urinary wetting or contamination.

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When the collar is drawn back it turns on itself and the mucous membrane becomes everted and later passes through a transitional state, whereby it becomes like the stratum corium of the true skin.

The advantages of the method we believe to be: First, it accomplishes the purpose of shortening the prepuce by resecting a section of integument, and preserves the normal prepucial orifice, leaves a covering for the glans, and removes the redundant tissue; second, it does not interfere with the frenum — its blood or nerve supply; third, the line of union is so far removed from the meatus (Fig. 7) that it does not become soiled during urination, thus favoring an aseptic wound. The line of union being on the shaft, the post-operative pain is nil, and patients suffer no inconvenience whatsoever in walking about immediately after operation.

The line of union shows well in Fig. 7. The photograph was taken fifteen days after the operation and in a short time the cicatrix becomes absorbed and lost in the normal folds of the integument.

We have had no patients complain of constriction caused by the cicatrix during erection, after the first month, and all have been satisfied with the results.

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SOME PLASTIC OPERATIONS ON THE PENIS AND URETHRA.

H. A. FOWLER,
WASHINGTON, D. C.

The following three cases of plastic operations on the penis and urethra have been selected from among the cases of this kind occurring in our clinic at Freedmen's Hospital because they illustrate in a convincing way the good results which may be obtained in this class of cases by relatively simple operations. They also illustrate incidentally and in a very striking way the serious results which too often attend the improper treatment of strictures of small caliber.

It is perfectly astonishing what abuse the urethra will sometimes suffer at the hands of the inexperienced and incautious, and yet no serious complications follow. It is quite as striking to note at times how a slight trauma is followed by complications of the gravest character, which result in extensive destruction of tissue, deformity, and at times irreparable damage. It is in the treatment of strictures of small caliber that one most often sees the unfortunate results of injudicious instrumentation. The cases I wish to report illustrate one type of this class and the methods adopted for the repair of the damage done.

Case 1. Stricture of the urethra. Extravasation of urine. Extensive sloughing of the urethra. Plastic repair.

M. W., aged thirty-two years, was admitted to Freedmen's Hospital complaining of inability to void. He was first seen about midnight and immediately

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operated upon. Examination showed a black, gangrenous scrotum swollen to nearly the size of a child's head. The extravasated urine extended into the perineum and up onto the pubes. The penis was greatly swollen but the tissues were not gangrenous. A small bougie à boule was passed. This apparently reached the bladder. This was followed by a small silk catheter, which also apparently reached the bladder, but only a few drops of urine were obtained. The operation consisted in making multiple incisions over the pubes and into the scrotum. The latter was so gangrenous and necrotic that it was quite completely removed, leaving the testicles with the tunica vaginalis unopened, completely uncovered and exposed. In view of the apparent patency of the urethra and of the extensive, sloughing wound, perineal drainage of the bladder was not deemed necessary or advisable.

Two days later a second operation became necessary. In the mean time the patient was unable to void freely, the extravasation of urine was extending and had reached the tuberosities of the ischium and the gluteal region on the right side. At the second operation the perineum was split longitudinally to the rectal sphincter. The tissues were distended with urine. The bulb was necrotic, there was no bleeding from it whatever, and the whole bulbous urethra, together with the scrotal urethra, was a soft, sloughing mass, and was removed by simply scraping it away by blunt dissection. The opening in the triangular urethra was found, the bladder opened and drained by a large retention catheter. Free drainage of the infiltrated tissues over the tuberosities was secured by free incisions.

As a result of the two operations a very extensive area was left to granulate. The condition of the patient at this time was such that recovery was hardly

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expected. However, he reacted surprisingly well, and in the course of the next few weeks the wound had so far contracted down that the problem of some plastic operation for the restoration of the urethra presented itself. At this time the edges of the wound had contracted down so that the testicles, which were held up close to the external ring, were covered in with normal skin over about half their surface. The perineal wound was reduced to a narrow strip of mucous membrane about one centimeter wide, extending from the drainage tube posteriorly to a point three inches from the meatus, where the uninjured segment of urethra began. On either side of this narrow strip of mucous membrane, which represented the roof of the destroyed urethra, was a narrow line of granulation tissue. The problem presented was to reconstruct a portion of the urethra to fill in the gap between the uninjured urethra in front and the posterior urethra, a distance of about four inches. As a basis for this reconstruction there was the portion of the roof of the destroyed urethra still remaining.

The reconstruction was accomplished in two stages, —first, plastic reconstruction of the urethra by a double flap from adjacent skin surfaces; second, closure of the drainage canal and union of this with the newly formed urethra by a second plastic operation.

Stage 1. An incision was made on one side parallel to the edge of the wound and close to the line of granulation. This extended from the posterior end of the uninjured urethra in front to a point on a level with the opening occupied by the drainage tube in the bladder. At either extremity of this incision a lateral incision was made about three and one-half centimeters long. The flap thus outlined was dissected up *away* from the urethra, comprising the whole thickness of the skin. A similar parallel incision was made on the right side of the urethra,

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but three and one-half centimeters from it. At either extremity of this incision a lateral incision was made, extending to the line of granulation tissue. This flap was dissected up *toward* the urethra. Over a catheter introduced through the meatus and lying along the groove formed by the remaining strip of mucous membrane, flap number two was turned backward with the skin surface next to the catheter and sutured in place with interrupted fine silk sutures. This flap was to form the floor of the new urethra and presented a skin surface toward the lumen of the new canal. Flap number one was now brought over by sliding and stretching to cover in the raw surfaces and was held in place by fine silk sutures. The catheter was allowed to remain in place, protruding from under the posterior edge of the flaps. The skin partially covering the testicles was dissected up and brought together in the mid line, covering in a part of the denuded urethra. The testicles and the granulating area between them was thus completely covered in. This completed the first stage.

Stage 2. In the healing of the wound after the first operation there was some retraction of the flaps which lengthened somewhat the space between the posterior end of the new canal and the opening which drained the bladder. The catheter which had served for drainage through the perineal wound was now replaced by one introduced through the meatus and passed on into the bladder. By suitable incisions flaps were dissected upon either side of the urethra still remaining uncovered and these were united over the catheter. The retention catheter was allowed to remain in position ten days, at which time it was removed and the urine allowed to pass through the new urethra. A small fistula formed at the site of the perineal drainage wound, which healed rapidly by

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granulation and was completely closed in a short time.

The results obtained were astonishingly good. From time to time sounds were passed to insure the patency of the new canal. Number 26 F. sound was passed with ease. There was no tendency to contraction or stricture formation. Urination was normal in every respect except for frequency due to diminished bladder capacity. This has improved under treatment. The following note was made in April, 1911.

The scrotum and perineum look and feel perfectly normal. The scrotum is small and keeps the testicles well supported. The scar from the operations is seen only by very close inspection. Urination is normal except for some frequency, about every two hours. The stream is full and strong. A Buerger cystourethroscope was introduced with ease. There was no stricture. The reconstructed urethral floor is lined by moist horny epithelium and is devoid of blood vessels. It has a peculiar white parchment color, which is very striking in contrast with the normal urethra in front. In the region of the bulb several long hairs are seen projecting from the floor and coiled up in the lumen of the urethra. These cause no symptoms and the patient is unaware of their presence. There is marked infection and inflammation of the posterior urethra. Examination of the bladder is unsatisfactory on account of the diminished capacity and the length of the beak of the instrument. The result has been very satisfactory and the patient is particularly pleased.

Case 2. Stricture of the urethra. Periurethral abscess. Phlegmon of the penis and scrotum. Extensive sloughing of the covering of the penis.

R., colored, aged thirty-five years, was admitted to Freedmen's Hospital in 1906. On admission the temperature was 102 and pulse 120. He was ex-

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tremely ill and operation was performed immediately. The scrotum was greatly swollen, black, and gangrenous. The penis was enormously swollen and the tissues covering it were necrotic. A membranous, valve-like stricture of small caliber was found in the bulbous urethra. This was readily dilated to admit a number 16 silk catheter. The usual multiple incisions were then made in the scrotum and over the pubes. The scrotal tissues were not as necrotic as in case one, and their removal was not necessary. The skin covering the penis, however, was sloughing extensively and was completely removed except for a narrow strip about two centimeters wide on the right side. At the base of the penis in the region of the suspensory ligament a periurethral abscess was opened and several drams of pus evacuated.

The incisions in the scrotum and over the pubes granulated promptly with practically no sloughing. A fistula developed at the site of the abscess and discharged urine for two weeks. This closed itself as the wound granulated. The stricture, meanwhile, was gradually dilated to admit a number 30 F. sound readily. The entire penis from the corona to the base was completely denuded of skin, except for a narrow strip along one side, not over two centimeters wide. The problem then was to cover in this granulating area and preserve to the patient a useful organ. Having considered several methods it was finally decided to adopt the simplest one and cover in this area by a skin flap from the scrotum. Accordingly a rectangular flap was marked out on the scrotum, of proper size to cover the wound, with its base at the base of the penis. This was dissected up, leaving only a narrow line of attachment, and readily rotated into position, where it was held by interrupted sutures of fine silk. The area was prepared to receive the flap by cutting down close all granulations and check-

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ing hemorrhage by pressure. The wound was dressed with silver foil.

The flap united perfectly everywhere except at the base, where there was a slight separation due to too great tension. This healed rapidly by granulation. The result was perfectly satisfactory. In the course of a few weeks the transplanted skin became freely movable on the tissues beneath, there was no deformity, and the results from the standpoint of function and cosmetics left nothing to be desired.

Case 3. Stricture of the urethra. Phlegmon of the urethra. Sloughing of the corpora cavernosa. Obliteration of the urethra.

L., aged twenty-nine years, was admitted to Freedmen's Hospital complaining of a swollen penis and inability to urinate. Examination showed an enormously swollen penis, hard, infiltrated, and the skin black and gangrenous. The scrotum and perineum was not involved. The body of the penis was enormously swollen, infiltrated, and could be followed back through the scrotum to the attachment of the crura as a hard, indurated mass. At a point two inches behind the frenum a fistula had formed through which all the urine was escaping. At the frenum was another fistulous opening communicating with the urethra. Perineal section was performed at once. The perineal urethra was dilated. On cutting down on the fascia covering and inclosing the corpora cavernosa this was found to be of a slaty color and manifestly necrotic. An incision was therefore made into and through the corpus cavernosum on each side, so that each of these bodies was split longitudinally for a distance of about four inches. There was absolutely no bleeding from these incisions; the whole penis appeared to be necrotic and it was thought it would slough away.

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For a week or more the penis was a sloughing mass, the discharge was profuse. There appeared to be no healthy tissue remaining, so that complete removal seemed to be the only thing left to do. This the patient begged us to do. He was sent to the operating room for this purpose, but in cleaning up the wounds under an anæsthetic it was evident that there was some healthy tissue still remaining. Accordingly, further operation was postponed, in order to see how much, if any, of the penis could be saved. Much to our surprise the sloughs finally separated, leaving healthy granulating wounds in each of the longitudinally bisected corpora cavernosa. The retention catheter was removed, the perineal wound rapidly closed, and the urine now escaped through the incision in the right corpus cavernosum. Nothing could be passed through the first two inches of the urethra, either through the meatus or by retrogade instrumentation through the perineal wound.

The incision into the left corpus healed rapidly; that into the right contracted down to a relatively small opening through which all the urine was escaping. The gradual contraction of this wound made urination increasingly more difficult. Some procedure was necessary, therefore, to re-establish the patency of the anterior segment of the urethra and divert the urine through its normal channel. Two courses presented themselves for accomplishing this end: (1) transplanting a segment of a blood vessel, or an appendix or some other tissue, to form a new urethral segment lined with mucous membrane; or (2) to tunnel through the tissue, in the hope that some remnant of the urethra might be found which would serve as islands of mucous membrane, from which the canal thus formed would eventually become lined with mucous membrane. For certain reasons the latter course was adopted. The perineal urethra was again

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opened and the urethra followed to the point where it opened on the side of the penis. Search was made for some vestige of the urethral mucous membrane anterior to this point, but none could be found. The obliterated segment was then tunneled through to the meatus, the canal dilated to 30 F., and united to the outer end of the healthy urethra posteriorly. The wound through which the urine had been escaping was then closed by sutures. Healing was prompt. Removal of the retention catheter was followed by normal urination through the meatus.

It is to be noted that this newly formed urethra, comprising a segment of about two inches, was made by merely tunneling through the tissues and dilating to 30 F. There was no epithelial lining, and as might be expected contraction took place at first rather rapidly. The lumen at first was maintained very satisfactorily by dilation every ten days. During one much longer period, when he was unable to come for treatment, contraction had taken place to such a degree as to interfere with urination. Dilatation had to be done under an anæsthetic. Since that time the channel has been kept well open by the passage of sounds. At the present time these are passed once a month. This is quite sufficient to keep the urethra from recontracting. He voids a large stream. So far there is no appreciable evidence of the growth of epithelium into this segment from either end, and it seems doubtful if such will occur. However, it is barely possible that the formation of an epithelial covering may occur from such an overgrowth from the normal epithelium. Further progress of the case will be watched with interest, as the patient has consented to a further plastic operation if this is found necessary and advisable.

This is the only case of phlegmon of the penis involving the corpora cavernosa and causing extensive

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necrosis which has come under my observation. Extensive destruction of the superficial tissues in these cases of stricture with phlegmon is common, but involvement of the corpora cavernosa must be very unusual. In all three cases the history shows that the condition was the direct result of the injudicious use of instruments in dilating a stricture of the anterior urethra. Considering the number of cases seen in the clinic of stricture with various complications due to this same cause, this particular complication must indeed be rare.

DISCUSSION

OF PAPERS OF DRS. TOWNSEND AND FOWLER.

DR. DANIEL N. EISENDRATH of Chicago: The last case Dr. Fowler reported interested me considerably, because his suggestion of the possibility of using the appendix or some similar structure to replace the urethra is one that I have tried personally to use in cases of plastic operations on the ureters. We began a series of experiments, but so far they have not been very satisfactory. It has been suggested in the case of the ureter, where almost similar conditions exist as in the urethra, to use the veins. I do not know who it was that first suggested the use of the saphenous vein, but it was found that the vein would not stand the constant passage of the urine over it, that it soon became ulcerated and converted into connective tissue. Then it was suggested that other structures be used, and it was found that in order to supply the defect in the ureter it was necessary to use something like the appendix, which would have a mucous lining. Those were the only structures which would tolerate the passage of the urine over them. With this in view a suggestion has been made to me personally by the associate of Dr. Matas of New Orleans, to take a portion of the Fallopian tube and use that instead of the ureter. We tried that in one case on an animal, and everything went along nicely for a number of weeks, but later on cicatricial contraction took place at the point where the Fallopian tube was transplanted, with a resulting hydronephrosis. There have been experiments of a

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similar nature performed abroad, but so far no satisfactory structure has been found with a mucous lining to take the place of the ureter or urethra, so far as I know.

The suggestion made by Dr. Fowler in one of the cases which he reported is somewhat similar to the idea of doing the Thiersch operation for hypospadias. We performed that on several occasions, with excellent results, taking the neighboring epidermis and turning it in on one side to form the floor of the urethra, or practically the entire circumference of the urethra, and then taking a second flap from the opposite side to form the outer surface. There is still considerable work to be done in this direction, and I think that only attempts such as Dr. Fowler has made will give us any light on this subject.

DR. LELAND BOOGHER of St. Louis: I was interested in Dr. Townsend's paper because I have done a great deal of that work. A case of my own might be of interest to you, in which the foreskin was slightly more than three inches long. In fact, when I had removed the foreskin there was so little body to the penis that it did not measure more than an inch and a half. I do not use any clamps — simply a curved pair of scissors and a needle. I always leave enough of the foreskin to more than cover the middle of the glans. In this case of a student twenty-two years of age, he had never known what it was to have erections, because there was so much redundancy of the prepuce. I saw him about seven years afterwards, and I was astonished at the increase in the size of the organ. It had increased to about four inches in length. I do not see why any one goes to the trouble of putting on clamps in removal of the foreskin. All you need are scissors and a needle. But I think a very important thing is to leave enough of the foreskin to cover half of the glans penis, because I have seen so many of those cases where the foreskin had been removed to such an extent that copulation was disgusting and most frequently painful.

DR. G. KOLISCHER of Chicago: I should like to talk of the theoretical part of this question. If it be true that the removal of the prepuce leads to a keratosis of the glans penis and if this keratosis interferes with the sexual power, it will be very hard to explain why those races who remove the foreskin early in youth are the most prolific ones.

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DR. JOHN A. HAWKINS of Pittsburgh: Might I just report, without any further comment, two cases of necrosis and gangrene of the penis in which the glans was completely destroyed, one resulting in death. In one case we could find no cause, and the other one followed an attack of gonorrhœa.

DR. TOWNSEND: I do not see why it would not be perfectly possible to perform the technique which I suggested without the aid of the clamp. However, I found it easier to keep away from the prepucial orifice and accomplish my resection with it, so have used it as a routine. Regarding the point of hornification of the glans: In my paper I suggested it simply as a possible etiological factor. I was discussing the subject from a surgical rather than from a religious standpoint, but will say, — not seriously though, — that perhaps the ancient lawmakers had in mind the procreative ability of the respective races and the possible inhibitive action induced by circumcision, when they conceived the law.

DR. FOWLER: Our limited experience in these cases emphasizes the fact, already well known, that in any plastic operation for the restoration of the urethra it is very important to provide an epithelial lining for the new canal. Where even the smallest remnant of the destroyed urethra remains this can be utilized and the new channel easily constructed by the flap method. It is really astonishing what perfect functional results can be obtained in these cases by such simple means. In the absence of any remnant of mucous membrane the tendency to contraction is marked. But as our experience shows, even in such cases the patency of the new canal can be maintained by dilatation at stated intervals and good functional results obtained.

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AN EXPERIMENTAL AND CLINICAL STUDY OF COLON BACILLUS INFECTIONS OF THE URINARY TRACT.[1]

IRVIN S. KOLL,
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The pathogenicity of the colon bacillus in its attack upon the urinary tract has placed these infections among the most interesting and provoking that the urologist encounters. Without pausing to consider the origin of colon bacillus infections of the urinary passages, I will briefly review some of the cultural characteristics of the organism in question, so that we may have some foundation for a working basis leading up to the experimental portions of this paper. Thriving, as this organism does, in the intestinal tract, its medium is under normal conditions of a strong alkaline reaction. Artificially grown, it curdles milk, which process probably depends on the fermentation of the lactose of the milk and the throwing down of the casein by the resulting lactic acid. Litmus bouillon or gelatin will soon give a slight acid reaction when inoculated with the colon bacillus. In short, the organism grows equally well on media slightly acid and on those of an alkaline reaction. The question arose, if it were possible to increase the acidity of the habitat, what would be the effect upon the resistance and mutiplying powers of the bacteria? To increase the alkalinity was not considered, because of the fact that the usual habitat,

[1] From the Laboratory of the Michael Reese Hospital.

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namely, the intestinal tract, where the colon best thrives, is strongly alkaline.

Reviewing the literature on chemical therapeutics, it was found that aluminum acetate had been very satisfactorily used in surgical dressings for many years. Dreuw[1] also used the drug by internal administration to reduce excessive intestinal fermentation, and he claims to have ameliorated the strangury of posterior gonorrhœal urethritis by the same means.

BACTERIOLOGICAL EXPERIMENTS.

Accordingly, the following series of bacteriological experiments was undertaken: First, two sets of twenty-four-hour cultures of four different strains of bacilli were taken, one in bouillon, one in urine. To each tube, which contained 5 c.c. of the culture, was added 5 c.c. of a two per cent suspension of the subacetate of aluminum. One urine and one bouillon culture of each strain were incubated respectively for two, five, seven, ten, twenty, thirty, forty, fifty and sixty minutes; then agar plates inoculated with one loop full of the culture. At the end of twenty-four hours the entire four sets had a countless number of colonies, thus showing the inertness of the insoluble subacetate of aluminum. Next, the same technique was used, substituting liquor aluminum acetate (N. F.)[2] for the insoluble subacetate. Beginning with full strength, which is nearly eight per cent, the experiments were carried down to a dilution of one per cent, each set one per cent lower than the previous, with a result which showed that it required a two per cent solution fifty minutes to completely destroy 5 c.c. of a twenty-four-hour bouillon or urine culture. Attenuation of the cultures was constant in proportion to the strength of the solution added, and time of incubation. Thus was proven

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the germicidal power of the liquor upon the colon bacillus.

I was now curious to know what the effect would be upon the other members of the colon group, and upon the staphylococcus. Accordingly, a series of experiments was gone through, as above, using different strains of para-colon, typhoid and staphylococcus pyogenes aureus and albus. The experiments, several times repeated, using controls, were uniform in their results, namely, a two per cent solution completely destroyed 5 c.c. of a twenty-four-hour culture of para-colon and typhoid bacilli in fifty minutes, but that at full strength the staphylococci were unaffected.

Having established the germicidal effect, the antiseptic power of the drug was next tried. To two sets of tubes of bouillon and sterile urine were added sufficient quantities of the liquor to make the correct percentage dilutions from eight to one; each tube was inoculated with 1/10 c.c. of twenty-four-hour bouillon cultures of the different strains and different bacteria, as in the foregoing. These were then incubated forty-eight hours, plated and again incubated. There were no growths on any of the colon, paracolon or typhoid plates, but all the staphylococcus plates contained an infinite number. Thus a one per cent solution was sufficient to prevent the growth of the different members of the colon family, but the full strength did not influence the staphylococci.

The question which next arose was whether or not acetic acid would give the same results. It was found that this was true, not only in its effect upon the colon group, but that a three per cent dilution succeeded in producing a complete germicidal and antiseptic effect upon the staphylococci.

A point which came up too late to be fully worked out before going to press was, What would be the

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action of acetic acid reduced to the same degree of acidity as the two per cent liquor aluminum acetate, expressed in terms of N/10 NaOH? This much was learned: One c.c. of two per cent acetic acid required 4.5 c.c. N/10 NaOH for neutralization, while only 1.5 c.c. N/10 NaOH was necessary to bring 1 c.c. of two per cent liquor aluminum acetate to the same reaction. The acetic acid reduced to the same degree in terms of N/10 NaOH had the same germicidal and antiseptic action as the two per cent liquor aluminum acetate. What the action upon the remainder of the colon group and staphylococci is, is now being determined.

CHEMICAL EXPERIMENTS.

Chemically, some of my results were not very productive, namely: I first tried to ascertain whether the internal administration of the subacetate of aluminum would raise the total acidity of the normal urine. I gave three grams a day to three individuals living about the same routine and upon the same diet. Taking an a.m., noon, and p.m. specimen, I titrated them with N/10 NaOH, using phenolphthalein as an indicator. For the seven days following the administration of the drug, compared with the seven days previous to it, there was a total increase of eighteen, calculated in terms of the NaOH. This is so small that I don't think we can attach much importance to it. There was no appreciable difference in the resisting power of the urine with the increased acidity when inoculated with a colon culture. However, urine that contained the higher acidity did not become infected as rapidly when allowed to remain exposed to the air as a specimen from the same individual previous to his taking the subacetate.

What is the effect of the liquor aluminum acetate upon the healthy mucosa of the urinary tract? was the

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next question to be solved before putting the results obtained to clinical use.

ANIMAL EXPERIMENTS.

To determine this a series of rabbits was used. A good-sized animal was prepared for abdominal operation, anæsthetized, both kidneys exposed and brought up into the incision. The right ureter — control — was clamped about 5 cm. below the kidney pelvis and then the organ was replaced into the abdomen. The left ureter was injected proximally with a two per cent dilution of the liquor aluminum acetate until the pelvis was distended. A clamp was then placed distal to the point of injection. Then 10 c.c. of the two per cent solution was injected downward through the ureter into the bladder, and the left kidney dropped back into the abdominal cavity. After the lapse of one hour, the animal being kept under the anæsthetic for the entire period, the clamps were removed and the incisions closed. Rabbit I was killed at the end of twenty-four hours; rabbit II at the end of forty-eight hours. The pelves of both kidneys, portions of both ureters and the urinary bladder were then examined macroscopically and histologically. There was no change whatever in any of the cellular structures, except a certain amount of hyperemia produced by the pressure upon the ureteral vessels, which could not be separated from the ureter. Great care was taken to find some evidence of necrosis or edema of the epithelium, but none could be found in any of the tissues. These experiments several times repeated proved constant. Increasing strengths were then used, and as soon as a greater concentration than four per cent was reached, changes began to manifest themsleves in the epithelial structures, in the nature of a cellular destruction, which reached a true state of marked general necrosis at a concentration of seven per cent.

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From these animal experiments we may conclude that a two per cent dilution of the liquor has no harmful effects upon the mucosa of the urinary tract. Whether or not the same degree of acidity in terms of N/10 NaOH of acetic acid will act in a like manner is now being determined.

CLINICAL OBSERVATIONS.

The clinical application of these results was now undertaken, and with such uniform and excellent results that I will report somewhat in detail a few of the more interesting cases. The cases are divided into three groups: First, those having unilateral pyelitis; second, those having cystitis; and, third, those having uerthritis — a total of twenty-seven cases.

In each case a bacteriological examination by culture was made of the urine before the treatment was instituted, and the colon bacillus found in every instance except one in pure culture. In the urethritis cases the discharge was examined bacteriologically, and in every instance cited the organism found in pure culture.

The pyelitis cases, seven in number, were treated by lavage with the two per cent liquor aluminum acetate, and three grams of the aluminum subacetate made into one-half gram tablets, two tablets given after meals. The lavage was carried out in the usual way, washing until the return fluid came away clear, then injecting about 10 c.c. of the solution and withdrawing the catheter. The treatments were repeated at intervals varying from two to five days, depending upon the reaction produced by the introduction of the cystoscope. The longest period of treatment was three months; the shortest, two weeks. In every case a culture from the urine was sterile, and the leucocytes either entirely gone or reduced to very few, before the treatment was stopped.

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Previous to the treatment the duration of the infection, judging from the patients' histories, varied from one to eight months. No unpleasant symptoms from the lavage developed in any case. The usual pain associated with these infections disappeared after the second or third washing. Only one patient was confined to the hospital on account of difficulty in urinating after the cystoscopy. Up to date there has been no recurrence, as I am in constant touch with all the patients. The first case treated was thirteen months ago. Two cases permit me to report to you more in detail.

I. Male, twenty-seven years of age. Three years ago had a left nephrolithotomy. Uneventful recovery. Two years later, following an attack of influenza, a severe pain developed over the left lumbar region. Tenderness over nephrotomy scar. Kidney not palpable. Temperature, 101°. Urine very turbid, slightly alkaline, loaded with pus, and pure colon culture obtained. Patient sent to Michael Reese Hospital. Hot applications; urotropin, gr. v, three times a day. Auto-vaccine made and large doses given. No improvement for one week. Then left pelvis irrigated with two per cent liquor aluminum acetate, vaccine and the urotropin stopped and the tablets of subacetate substituted. Two days later a second irrigation was given. At the end of five days the pain and tenderness had entirely disappeared, the urine was much clearer, though the colon bacilli were still present. The patient left the hospital at the end of the fourth week, having had ten irrigations. Urine sterile and only showing an occasional leucocyte. No recurrence at end of twelve months.

II. Male, aged forty-seven. Five years ago had a severe attack of acute nephritis following a lobar pneumonia. Eight months previous to consulting me had constant ache over right lumbar region, and

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occasionally had chilly sensations. He thought this was due to his "run down" condition from overwork and did not consult a physician. When first seen, he had distinct rigidity and tenderness over the right kidney. Temperature, 100°. Urine very turbid. Contained large casts of pus and a vigorous colon bacillus culture obtained. Pelvic lavage was advised at once, but the patient would not consent. So he was put on urotropin and auto-vaccines and kept on this treatment for six weeks, with little or no improvement "which could in any way be attributed to the vaccine therapy," to use the words of Geraghty.[3] The patient was finally induced to allow me to wash out his pelvis, and there was a most remarkable change in his urine at the end of ten days. It took nine treatments, however, extending over four weeks' time, before the urine became sterile. Eight months have elapsed and the patient has remained quite free from any urinary disturbance.

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PYELITIS CASES.

No.	Age.	Sex.	Duration of Symptoms before Treatment was Started.	Kidney affected	Duration of Treatment.	Urinalysis before Treatment.	Urinalysis when Treatment was Stopped.	Remarks.
1	27	Male	About four weeks	Left	Four weeks	Pure culture B. coli. Very many leucocytes	Culture sterile. Occasional leucocyte	Nephrolithotomy three years ago
2	47	Male	About eight months	Right	Two and a half months	Very many leucocytes	Culture sterile No leucocytes	Urotropin and vaccines tried unsuccessfully
3	40	Male	Several months	Right	Six weeks	Pure culture B. coli. Leucocytes 20 to 40 to low power field	Culture sterile Occasional leucocyte	Right nephrolithotomy, 6 months previously
4	20	Male	Several weeks	Right	Three and a half weeks	Pure culture B. coli. 30 to 40 leucocytes to low power field	Culture sterile Occasional leucocyte	Urotropin and vaccines used ineffectually
5	35	Female	Ten months	Right	Two months	Leucocytes. Culture of colon and staphylococci	Pure culture staphylococci. Leucocytes, 15 to 20 to field	Advised nephrotomy
6	29	Female	Six months	Right	Two weeks	Pure culture B. coli. Leucocytes	Culture sterile Leucocytes 6 to 8 to field	Pain entirely gone.
7	25	Female	Few weeks	Right	One month	Pure culture B. coli. Leucocytes	Sterile culture No leucocytes	Urotropin and vaccines used unsuccessfully

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The cystitis cases, eight in all, varied in age from twenty-four to eighty-four years. Duration of the infection previous to treatment, judged from patient's history, extended over a period varying from one week to several years. The longest time treatment lasted in any one case was four months, in the instance of a severe ulcerative cystitis that had existed for several years. The shortest time required to give a sterile urine and complete cessation from symptoms was ten days.

The treatment consisted in irrigating the bladder with either sterile water or boracic acid solution until the return washings were perfectly clear. This was followed by an instillation of from 60 to 120 c.c. of the two per cent liquor, which was left in the bladder until emptied by the succeeding urinary act. These irrigations are carried out from two to four times in the twenty-four hours, according to the severity of the inflammation, whether it is acute or chronic, and in accordance with the length of time the patient can retain the liquor. In addition to these irrigations, the aluminum subacetate is administered per mouth. Rectal suppositories of opium, belladonna and ichthyol are used for tenesmus and frequency. The sitz bath and other measures commonly adopted in vesical inflammations are employed. In the most severe cases there was marked relief in thirty-six to forty-eight hours, and the urine showed very rapid changes, going back to normal appearance in a very few days.

Two cases permit me to give you in detail: —

I. Male, aged eighty-four, referred to me by Dr. Louis A. Greensfelder. Had never had any urinary disturbance up to about two weeks before I saw him, when he suddenly developed marked frequency and very severe tenesmus. The urine was very foul smelling, strongly alkaline, full of pus and pure

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culture of colon bacilli. There was about 60 c.c. of residual. Median lobe of prostate encountered by prostatic catheter. Rectal examination negative. Suppositories, sitz baths, diet, urotropin and irrigation with 1: 10,000 oxycyanide of mercury (this was just before I began the use of the aluminum acetate) relieved the condition after about two weeks. The urine still gave a pure culture of colon bacilli. The patient was discharged and told to notify me on the least sign of the return of any symptoms, which he failed to do until several days after an acute exacerbation. The other irrigations were then started, and in about three and one-half weeks the urine became sterile and has remained so since. This patient is seen about once a month now, and his bladder is irrigated, to avoid any possibility of new infection.

II. Virgin, aged twenty-four. Claims that she has had bladder symptoms since she was fourteen years old, in the nature of frequency and tenesmus more or less pronounced. During the day she urinates every hour, sometimes every half hour, and must get up from one to three times during the night. The urine was very turbid, full of pus and shreds of mucosa. Pure culture of colon isolated. Cystoscopy had to be done under nitrous oxide anæsthesia, because the bladder could not hold more than thirty to forty c.c. without producing a tenesmus. The picture was that of a chronically inflamed, contracted bladder with numerous punctate erosions. After two weeks of irrigations and general treatment, the patient would go one and a half to two hours without urinating. At the end of four and a half weeks the urine was sterile, micturition not more often than every two and a half hours and seldom during the night was she disturbed. No recurrence at the end of six and a half months.

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CYSTITIS CASES.

No.	Age.	Sex.	Duration of Symptoms before Treatment was Started.	Duration of Treatment.	Urinalysis before Treatment.	Urinalysis when Treatment was Stopped.	Remarks.
1	40	Female	Several years	Four months	Many red and white corpuscles. Pure culture B. coli.	Sterile. No red or white cells	Chronic ulcerative cystitis
2	84	Male	Eight weeks	Four weeks	Leucocytes. Pure culture B. coli.	Occasional leucocyte Culture sterile	In good condition
3	24	Female	Intermittently for ten years	Four and a half weeks	Leucocytes. Pure culture B. coli.	Sterile and clear	Feels entirely well
4	74	Male	Three years	Two and a half months	Full of clumps of pus. Many red cells. Pure culture B. coli.	Sterile. Still 10 to 20 leucocytes to the field	Very large prostate. Complete retention when first seen
5	45	Female	Several months	Six weeks	Pure culture B. coli. Leucocytes	Sterile and no leucocytes	Diabetes insipidus. Bladder capacity, 3200 c.c. Median simple ulcer in bas fond
6	32	Female	Three months	Two months	Pure culture B. coli. Many leucocytes and erythrocytes	Sterile and clear	Traumatic ulcerative post-operative cystitis
7	62	Male	Several years	Nineteen days	Pure culture B. coli. Many leucocytes	Sterile. Cystoscopic showed mucous membrane normal. Urine clear	Prostatectomy for obstruction. Recovery uneventful
8	78	Female	One week	Twenty days	Pure culture B. coli. Many leucocytes	Sterile. Occasional leucocyte	Symptoms ceased in 48 hours. Culture sterile at end of twenty days.

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Not less interesting is the group of twelve cases of urethritis. The ages ranged from nineteen to thirty-eight. Duration of discharge previous to the acetate treatment varied from four days to eight years. In four of the cases there was no history of gonorrhœa. One patient presented himself with a profuse watery discharge four days after coitus. Microscopic examination and culture showed the colon bacilli in great abundance, which disappeared in thirty-six hours following injections.

The treatments consist in giving an anterior and posterior instillation with either the Guyon or Ultzman syringe every other day, and giving the patient a one to two per cent solution to inject twice daily, with the ordinary urethral glass syringe, instructing him to retain the injection fifteen to twenty minutes. If the case is stubborn, with enlarged glands or inflamed points, the latter are touched with the full strength liquor through the Valentine urethroscope. As soon as the discharge fails to show the presence of the bacilli, an astringent is substituted for the liquor. If the discharge is only the "morning drop," the patient is given a couple of slides with which to make a smear, which is examined when he presents himself for treatment.

Case I. Eight years ago contracted gonorrhœa. Following the disappearance of the gonococci there was intermittently a discharge, sometimes profuse, sometimes only present in the morning. Frequently it was thick, but white in color. First glass of urine turbid and full of the "tripperfäden." Bacteriological examination showed colon bacilli in abundance. Seventeen days after the instillations were begun the patient was entirely free from discharge. Two weeks later no shreds appeared in the urine and the culture was negative. No recurrence after six months.

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URETHRITIS CASES.

No.	Age.	Duration of Infection before Treatment was Started.	Duration of Treatment.	Examination of Urethral Discharge.	Condition when Treatment was Stopped.	Remarks.
1	38	2½ years	5 weeks	B. coli and many leucocytes	Few shreds in urine. Occasional moisture at meatus	Meatotomy. Two soft strictures dilated
2	27	Over 2 years	2½ months	B. coli and staphylococci. Many pus corpuscles	Perfectly cured	Staphylococci disappeared under vaccines and irrigations with the oxycyanide of mercury
3	33	Several months	15 days	Great numbers of B. coli. Pus; casts	Urine clear. Occasional moisture at meatus in morning	Several tight strictures which were dilated
4	26	20 months	2 months	B. coli and leucocytes	No discharge. Few shreds in first glass	Very small meatus. Would not consent to meatotomy
5	25	Intermittently 9 months	17 days	Few. B. coli. Culture pure. Many leucocytes	No discharge	
6	21	For 8 years	27 days	Great number of B. coli and leucocytes	No discharge. Few specks in first glass	
7	19	2 weeks	18 days	Great number of B. coli and leucocytes	No discharge. Urine clear	
8	37	1 year	24 days	Great number of B. coli and leucocytes	Slight moisture at meatus occasionally in morning	Meatotomy
9	28	Four days following coitus	10 days	Enormous number of B. coli and many leucocytes	Urine clear. Slight discharge of clear substance	All the bacilli disappeared in thirty-six hours
10	25	17 days	3 days	Enormous number of B. coli and many leucocytes	Very watery discharge that contained a few leucocytes. Few shreds in first glass	One week later patient developed an acute gonorrhœa.
11	34	4 days	3 days	Enormous number of B. coli and many leucocytes	Urine clear. No discharge	
12	41	7 weeks	10 days	Enormous number of B. coli and many leucocytes	Urine clear. No discharge	

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Case II. Eight months ago had slight attack of gonorrhœa which lasted only two weeks. Discharge recommenced in a few days, continuing constantly up to time patient came to me. Repeated examinations of discharge taken at various hours of the day showed only colon bacilli, proven by culture. Twenty-seven days were necessary to produce a sterile urine, with no shreds in it, and no discharge. No recurrence at end of four months.

SUMMARY.

From the experimental work described, we may conclude that: —

1. Liquor aluminum acetate in a dilution of two per cent is an active germicide and antiseptic agent to the colon bacillus and the colon bacillus group of bacteria.

2. Liquor aluminum acetate in two per cent dilution has no deleterious effects upon the mucous membrane of the urinary tract.

3. The germicidal and antiseptic properties are due to the acid radical of the drug, as proven by the experiments with acetic acid.

4. Whether or not the acetic acid produces any untoward action upon the mucous membrane of the urinary tract will be reported upon in a subsequent communication.

5. The internal administration of the subacetate of aluminum raises the total acidity of the urine, which is desirable in dealing with the colon bacillus infections of the urinary tract.

The clinical observations lead us to believe that: —

1. Colon bacillus infections of the kidney pelvis, urinary bladder and male urethra are more promptly ameliorated by the two per cent liquor aluminum acetate than by any therapeutic measure previously used.

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2. The bacteria in the urethral discharge disappear in from twenty-four to forty-eight hours following the instillation with the liquor, but other astringents may be necessary to "dry up" the discharge.

3. Care must be exercised in the preparation of the liquor aluminum acetate, as an excess of free acetic acid will produce unpleasant subjective symptoms. The solution must not be more than a week to ten days old when used.

4. The liquor aluminum acetate is of value only in those cases where the presence of the colon bacillus is proven by culture made under the most careful aseptic precautions.

CONCLUSION.

We all well know that in medicine, more than in any other branch of science, facts to be of value must be based upon a greater number of successfully treated cases than herein cited. So I keenly appreciate that twenty-seven cases do not solve a problem that has perplexed modern urology. I present the results of my experimental work and clinical observations for what they are worth, and ask those of you who are interested in this subject to coöperate with me in the attempt to further prove or disprove the value of the foregoing treatment in combatting colon bacillus infection of the urinary tract.

In conclusion, I wish to express my gratitude to Dr. J. W. Jobling, pathologist to the Michael Reese Hospital, for his untiring assistance, and to Dr. Sol Strouse, his associate, for his many valuable suggestions. In addition, I want to thank Drs. L. A. Greensfelder and I. A. Abt for the privilege of utilizing their clinical material at the Michael Reese Hospital.

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URINARY INFECTION.

BENJAMIN TENNEY AND HENRY M. CHASE,
BOSTON, MASS.

The presence of bacteria in the bladder urine is not uncommon. In the course of diseases affecting organs of the body outside the urinary tract, the kidneys excrete the bacteria causing the disease, often without producing lesions discoverable in the kidney, and without showing in the urinary sediment any evidence of renal irritation.

That the excretion of bacteria is a part of the renal function has been proved by the examination of the urine of typhoid and other intestinal diseases, in cases of peritonitis, in the diarrhœas of infancy, and in pneumococcus, streptococcus, and staphylococcus infections, all without evidence of renal irritation. In fact, a bacteriuria without subjective urinary symptoms and with less blood and pus than will produce an albumen reaction is an indication of disease outside the kidneys.

Even the tubercle bacillus, which is the most persistent enemy of the kidney, and the streptococcus, which is its most active destroyer, may be excreted for a time without doing damage which is visible to the microscopist. A host of experimenters all over the world have demonstrated this on all the laboratory animals. The names and some details of their experiments are given in Legueu's recent book and Meinhertz's monograph.

Researches of the last ten years have shown the presence of living organisms in the blood and perma-

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nent body fluids in an ever-increasing number of conditions, and it is more than possible that some of our so-called urinary antiseptics produce their results in the general blood current rather than in any part of the urinary tract, and reduce the bacterial content of the urine by reducing the supply from which it is drawn.

However certain we are of the constant possibility of urinary infection from the general blood current, we cannot deny the possibility of its occasional occurrence through the lymphatics, by way of the urethra, and by direct extension from neighboring tissues.

It is confusing to find the word "bacteriuria" used to describe both the simple filtration and the condition where there is an apparent multiplication of organisms within the urinary tract. If bacteria are to increase in number after reaching the kidney there must be some area where this increase occurs, and this would seem to require a local retention of urine or else a localized inflammation, either of which would be better described under its own proper name.

Three factors at least enter into the question of what the result of renal filtration of bacteria shall be: first, the type of organism; second, the resistance of the individual, and third, the free passage of urine from the glomeruli to the meatus.

For grave disease of the kidney the tubercle bacillus appears to be the most common infecting agent. In the last five years the diagnosis of tubercular kidney appears seventy-six times in the reports of the two large Boston hospitals, compared with fifty-four diagnoses of pyonephrosis.

In the course of some experiments on animals, one of us injected an emulsion of tubercle bacilli into the left renal artery of several rabbits. One of these died ten months later with a large pus kidney. No

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trace of tubercle was found in the ureter or wall of the sac, or remaining kidney substance.

The bacilli may have filtered through without doing damage, or they may have started a process which was overgrown so rapidly by some other organism that all traces of it were lost.

In August, 1908, we removed a pus kidney from a patient with a history of six years of frequent urination. The pathologist reported, "Tubercle in ureter; none found in remaining kidney substance; process undoubtedly tubercular."

These two experiences have suggested the possibility of a tubercular origin in other cases not so classed. In this same connection the occasional calcification of a tubercular lesion is suggested as a possible source of the nucleus of some renal stones.

The colon bacillus is said to be the organism most common in infections above the urethra. Whether as the real cause of the lesions or appearing as a saprophyte it is hard to say.

Most of the pyogenic organisms have been reported in lesions of the urinary tract, both aërobic and anaërobic, and the inconvenience to the patient has been severe with all and slight with all at some stage of the disease.

The streptococcus has twice appeared in our work, both cases with bloody urine, severe pyelitis, and ureteritis, hemorrhagic infarcts, and high fever.

Can any one say just how much individual immunity has to do with the development of disease? The cases of hydronephrosis which have caused symptoms for months and years and are found not infected at operation, show that urinary obstruction is not the only condition necessary for the septic destruction of a kidney exposed to the ordinary risks of life.

On the other hand, the infections which follow urethral stricture, prostatic obstruction, pressure of

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the pregnant uterus, strictures, kinks and stones in the ureter are familiar to us all.

An exhaustive research into the effect of ureter obstruction on the susceptibility of the kidney, by J. Meinhertz, was published in "Virchow's Archive," Vol. 192, for 1908. He quotes previous investigators, gives the results of a large number of rabbit inoculations, and draws definite and logical conclusions.

His inoculations were of bovine tubercle bacilli, rapidly fatal to rabbits and made directly into the aorta. The left ureter was tied in each rabbit at varying intervals of days before and after the inoculation. The rabbits lived from six to twenty days, most dying about fifteen days after the inoculation. Lesions were found in both kidneys, but by far the greater number and the more serious lesions were in the left kidney.

The essential lesion was a septic thrombosis in the capillaries in and near the glomeruli. With this was associated a venous hyperemia on the ligated side and an arterial hyperemia on the other side. This venous hyperemia has been found to follow ligation of the ureter by other observers, and he regards this hyperemia, or venous stasis, as the essential factor for the septic thrombosis, rather than the mechanical hindrance to excretion which the uronephrosis produces, because he never found bacilli lying free in the uriniferous tubules.

His results seem conclusive that for massive infections — he injected five cm. of a salt solution suspension of the bacilli — complete obstruction of the ureter determined the side of greatest kidney lesion.

If it is reasonable to suppose that intermittent obstruction occurring at a time when there is a moderate tubercular invasion of the blood has the same effect in producing a venous stasis and encouraging thrombosis about clumps of bacilli in the capil-

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laries we have a working theory as to the occurrence of the destructive renal infections.

Trauma of any sort producing venous stasis would predispose to capillary thrombosis and destructive renal infection, as Orth has shown.

The questions for us to answer for these patients are whether they have a self-limited disease whose tendency is to complete recovery, or conditions self limited in time but producing some permanent impairment, or a progressive disease. To answer these we must make a localizing diagnosis, a functional diagnosis, and a bacteriological diagnosis.

The source of the frequent and painful urination, if our theories are correct, will be found most often in the ureter, which is shortened as a result of an inflammatory process, pulls on the prostatic urethra, and starts the bladder contraction at more and more frequent intervals. Later the bladder walls thicken and contract, and its actual capacity is greatly reduced.

Whatever part be played by these factors we have to advise and treat patients who complain of frequent and painful urination, and who show pus and some blood in their urines without either stone or tumor in any part of the urinary tract.

These symptoms are still considered by some to justify the diagnosis of a cystitis, but the use of the cystoscope has taught us that the relation of the bladder to these symptoms is almost identical with the relation of the stomach to the various symptoms of indigestion, — it may be responsible, but probably is not. It has taught us that most cases of genuine cystitis are secondary to conditions above and below the bladder, whose removal will allow the bladder to act normally and comfortably.

We do see occasionally what we regard as a genuine acute cystitis not secondary to infection higher up,

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and which produces precisely the same symptoms. Such a case should respond promptly to appropriate treatment, and fortunately it usually does, but a diagnosis of "cystitis" is due for revision if the symptoms last more than a few weeks. If the condition is more than a few weeks old the presumption is that it is due to conditions still existing above or below the bladder, and it calls for careful study with the microscope, the cystoscope, and the ureteral catheter.

With a careful history, a bimanual and digital examination, and these diagnostic instruments a correct localization is usually possible. A less exact conclusion is possible as to the functional activity of the two kidneys, whether we use the color test or the separate urea tests. In general, we believe that a patient is better off with a single sound kidney than with two, one of which is seriously damaged. The bacteriological diagnosis is in the great majority of cases accurate and satisfactory so far as the tubercle bacillus is concerned, though there is a possibility of error both ways. We have removed three kidneys reported as tubercular by the pathologist from patients whose urine failed to produce tuberculosis in the guinea pig within six weeks of a single inoculation. This was due in one case to a closed ureter and in the others doubtless to the specimen being taken at a time when bacilli were not coming through.

Bolognesi, in the "Annales des Malad. des Org. Gen. Urin.," Vol. XXIX, p. 577, has reported a nephrectomy for supposed tubercular kidney on a case with tubercle bacilluria where the kidney showed only slight lesions, and these not tubercular.

There is one other diagnostic point on which we have come to place great reliance — the ureteral thickening easy to determine in the female, but so high up that we have never been sure of it in the male before operation. This we now regard as the

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best index as to the desirability of a nephrectomy. Tenderness at the ureteral insertion is generally accepted as indicating trouble higher up on the same side, but not determining the kind of disease. Thickening has always been associated with a chronic inflammatory process and usually a tubercular process in our cases.

If we accept the theory of back pressure from the ureter as determining the settlement of bacteria in the kidney, our first thought will be to relieve that pressure by straightening the kinks and removing obstructions and external pressure from the ureter. This seems to us the most hopeful path out of the long-continued annoyance of the early non-tubercular urinary infections above the bladder.

External pressure on the ureter must be relieved by posture or operation. Kinks, faulty pelvic attachments, and internal obstructions must have appropriate treatment.

For the early tubercular infections of those not dependent on their earnings it is fair to try the same mechanical treatment, followed by appropriate climatic and hygienic care.

If there has been a settlement of bacilli in one kidney it may be possible for it to clean itself if the mechanical conditions are set right.

For those whose circumstances do not allow the long period of rest and proper care, a nephrectomy offers the best way out. If one kidney be involved alone, it is an indication at least that the mechanical conditions in the other do not favor the settlement of bacilli there, even if they do exist in the blood.

The uncertainty is so great and the time of suspense so long that the majority of our patients are better off to lose a single tubercular kidney by the time ureter changes appear, whether the affected area be large or small.

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To sum up, we know that bacteria of various sorts appear in the circulatory system and pass into the kidneys. We know that all these bacteria may filter through and leave no trace, or they may damage the kidney in passing, or they may make a prolonged and destructive stay in the kidney.

Meinhertz and others have shown that ligating the ureter on one side is followed by a venous hyperemia and a slowing of the venous current. Meinhertz has found that tubercle bacilli in the blood during this condition are much more likely to settle on the affected side, in the capillaries and not in the tubules, and that they are found in connection with capillary thrombi.

Our working theory, based on these known facts, is that all causes producing obstruction of the ureter increase the chance of renal infection while they last, and that the rest of the process depends on the appearance of certain bacteria at the favorable moment.

Our treatment based on this is the attempt to remove all causes of back pressure and to reduce the supply of bacteria in the blood in all reasonable ways. When the infection is known to be tubercular in only one kidney, and the ureter is not greatly thickened, a few months of hygiene and the regular tuberculosis cure may be permissible for the patient whose pocket and disposition permit.

A tubercular kidney with a thickened ureter in the average patient seriously interferes with his comfort and convenience, is almost certainly a progressive menace to health, leads to an extremely painful last illness, and needs nephrectomy like a malignant disease.

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DISCUSSION

OF PAPERS OF DRS. KOLL AND TENNEY.

DR. EDWARD L. KEYES, JR., of New York: I think we ought to congratulate ourselves upon having been here to hear Dr. Koll's paper. His results are so remarkable that, while I am sure we are all going home and try his aluminum acetate, it is almost incredible that we have gotten hold of something which can in one hundred per cent of cases eliminate the colon bacillus from the pelvis of the kidney. That is so far beyond my imagination that my mind fails to grasp it. It is impossible for me to believe it until I see it myself. Nevertheless, of course, I accept the possibility of it, and look forward with great hope to my own results with the treatment.

I should like to ask Dr. Koll two or three questions. I understood him to say that he had cured all the renal cases that he had treated. I did not understand whether he had cured all of the bladder and urethra cases. I should be interested to know also whether the aluminum acetate was tried against silver nitrate, in the bladder particularly — whether any of the cases that were cured by that had failed under silver nitrate. I should like to know also as a mere matter of curiosity what percentage of his cases of non-gonorrhœal urethritis were colon cases. I went into the bacteriology of non-gonorrhœal urethritis with a good deal of interest in reference to the cases which I reported this morning, and was astonished to find how rarely the colon bacillus appeared in the urethra. I should think not more than about half a dozen times in over a hundred examinations.

I was also greatly interested in Dr. Tenney's paper, but wish to raise a voice of protest against some of his conclusions. In the first place, I do not think that straightening out kinks posturally or mechanically or operatively will suffice to get rid of the colon bacilli, for instance, from all cases of pyelitis. The lesion is within the kidney substance as well as in the ureteral side of the kidney pelvis. In the second place, following the same idea further, I think that the prime lesion of tuberculosis is in the renal side of the renal pelvis, and that there is not only just as much reason to take out a kidney which suffers from early renal tuberculosis, but there is a great deal more reason to take that kidney out than in a late case of renal tuberculosis, for we must choose between operative and pathological nephrec-

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tomy. Not only is operative nephrectomy safer in the main than the pathological destruction of the kidney, but the earlier it is done the safer it is.

DR. GUY L. HUNNER, of Baltimore: Dr. Koll's paper brought up some ideas that were new to me as regards the colon bacillus and its habits. I had always supposed that the colon bacillus preferred a slightly acid medium. I believe I understood Dr. Koll to say that it preferred a slightly alkaline medium. Personally I have never seen a colon bacillus infection of the urinary tract that showed an alkaline urine when the urine was fresh, We know that the colon bacillus turns our litmus milk solution acid and still thrives, and I should suppose from that that it preferred the acid medium. However, Dr. Koll's results are splendid, and I agree with Dr. Keyes that we will all go home and make some new tests.

My experience with colon pyelitis cases has been rather limited. I have had a few cases in women who were suffering from post-puerperal pyelitis, all of which got well very promptly with the silver nitrate irrigation — much more promptly than the doctor apparently got with his aluminum acetate preparation. One of these cases had been going on four months with all the usual drugs by mouth, formalin solution, pushing water, and different antiseptics. One had been suffering about a year, and one four years, and the pyelitis still persisted, with a strong colon bacillus infection and acid urine. I think none of those cases required more than a second irrigation, three or four days apart — irrigation of the pelvis of the kidney with 1 to 3,000 silver nitrate in some of the cases and 1 to 1,000 in the others. I usually make the injection with a two-way glass syringe, four syringefuls of 15 c.c. each — that is, about 60 c.c. all together of silver nitrate solution. I am using 1 to 1,000 now, and find that it does not seem to irritate the pelvis. I then follow that with boric acid solution, to wash away any excess silver and prevent inflammation of the pelvis. The results have been perfectly astonishing. One of these cases had suffered four years. She was a doctor's wife who had been about the country to a number of different men, and had had the usual methods of treatment. She had such a painful kidney that she could not ride in the street car or walk half a dozen blocks. She cleared up, I think, with three irrigations.

And then a little child ten years old had a para colon infection. She was supposed to have had typhoid last summer, and finally, not getting well, she was sent to the hospital, and

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she had a most interesting chart. She would today have a urine comparatively clear. Tomorrow the urine would be somewhat more cloudy, and the next day densely cloudy, and suddenly in perhaps four or five or six days the urine would be absolutely clear, and her temperature would shoot up to 103°, with chill, and a great deal of pain in her left kidney. She was thin, and her kidney was easily palpable, but was not enlarged much at that time, so I made a probable diagnosis of an obstruction, not in the entire pelvis of the kidney, which to my mind would have given a larger tumor — I made a diagnosis of a probable long neck of a calyx and just one portion of the kidney being shut off at this time when the clear urine was present with the chill and high temperature. When she would suddenly get easy from this condition, the urine again became purulent, her temperature would drop, and the kidney become less tender. After giving her two irrigations of 1 to 3,000 silver, all infection and pus disappeared. Then I made a collargol injection and had an X-ray taken, and found the condition that I had predicted, a long neck, separating from the true pelvis, a little enlargement of one of the lower calices.

I have not had such prompt results with the treatment of cystitis cases with silver nitrate, and the doctor's report on aluminum acetate in cystitis cases is certainly very interesting and promising.

DR. BRANSFORD LEWIS, of St. Louis: Both of these papers are to me very interesting, and offer very valuable thoughts. Dr. Tenney mentions the fact that it is advisable if a cystitis continues for more than two or three weeks to look further as to the diagnosis. I think that is one of the most valuable thoughts that have come out in these papers. I think that is overlooked very often. I have gotten lazy on my own diagnosis sometimes and slept on a case, treating the lower urinary tract, and suddenly I would wake up, make a cystoscopic examination, catheterize the ureters and have the diagnosis cleared up. Of course one does not want to do a cystoscopy until he has a reason for it. But that is a definite, tangible reason that I think is not always appreciated.

Another interesting thought about these colon bacillary infections is their tendency to rebelliousness. I am going to get acquainted with this liquor alumini acetatis and make use of it. I am not going to get too much excited about it and expect too much of it, because I believe it will be in the same category with a great many other very useful but not invariably success-

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ful remedies. I have gotten over my belief in unvarying success from any remedy. I have my preferences, and I hope that the doctor's expectations and his experiences will be realized in the further use of this medicine. You take any remedy — for instance, the nitrate of silver which Dr. Hunner mentions. In a very considerable proportion of cases of colon bacillary infection you can use it with admirable success, and then in a few weeks the infection may come back in a most unaccountable way. It is the rebelliousness of this infection that has bothered me most. I agree with Dr. Hunner as to the excellence of results obtained from the use of nitrate of silver, but I have made better use of argyrol; but I had a case within the past month that was very interesting. That, too, was a doctor's wife, and reminds me a good deal of Dr. Hunner's case. This lady had been an invalid and incapacitated for over four years. She had had recurrent renal attacks that were very severe, most all of them coming from the left side. On investigation I found that the pus and colon bacilli came from the right side, and none from the left. I did a ureteral catheterization and irrigated with argyrol on a Wednesday; on the following Saturday morning I cystoscoped and catheterized both ureters and got absolutely clear urine; and in a number of microscopic fields searched there were only a very few colon bacilli present and no pus, where as on the Wednesday there had been a large amount of pus and a large number of colon bacilli. The next week catheterization showed a continuation of the clear urine, and I let her go home.

Another patient, a woman of thirty, that I saw last winter had had frequency of urination since childhood. She never was free from this desire to urinate. She had never had any treatment until the past year, when I found a colon bacillary infection in the pelvis of both kidneys. After a few irrigations with argyrol she was cleared up and has been well for about two months now, which is the first period of comfort she has ever experienced with reference to urination, she says.

DR. JAMES A. GARDNER, of Buffalo: I should like to ask Dr. Koll how frequently he uses the acetate in, first, urethritis and cystitis and in lavage of the kidney, what he is guided by, and also the dose of the subacetate which he uses by mouth.

DR. G. KOLISCHER, of Chicago: In judging our efforts I think we do not gain much by quoting so many cases. We have to come to a basis from which we can judge our therapeutic efforts. We must emancipate ourselves from the idea that by injecting a

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certain antiseptic fluid we cure the patient by killing all the microbes present. That is an impossibility. We may kill a few bacilli on the surface, but the cure is accomplished only in this way: we either change the soil on which these germs thrive in such a way that the germs perish, or we produce such a tremendous reaction that the infected tissue and with it the germs are thrown off.

As to renal lavage, I pointed out twenty years ago that the various results following renal lavage can be explained in a simple way; it is not what we inject, but the fact that we inject and drain, that we cure so many of the cases. For instance, for the removal of impacted ureteral stone I devised fifteen years ago the method of injecting vaseline or oil, into the ureter, and I found that some patients improved although the stones were not removed, evidently by the effect of flushing and drainage, but after some time the symptoms recurred. We have to be very cautious in making the definite statement that such and such a drug is specific, because it kills germs in vitro in the laboratory. I do not for a moment doubt Dr. Koll's statements, but I think all these reports must be taken with a grain of salt.

There is another consideration which is often overlooked. You take a female patient with a colon infection. When we begin to wash out her kidney or bladder we put her at the same time on some sensible regime, we clean out the intestines, regulate the diet, and so on. The organs are now in a favorable position to get rid of the germs, because the source of infection is stopped. A great many little children suffer from a pyelitis due to colon infection. These cases generally recover without any local treatment, if we clean them out and give them urotropin. Of course I do not believe that by giving urotropin we transform the urine into an antiseptic urine, killing off all of these germs. I think that the diuretic action of this drug and the subsequent flushing out of the kidney helps a great deal.

One experience taught me how valuable the consideration of the ureter in connection with bladder trouble is. You all know that there are certain gynecological operations where we detach the bladder from its junction with the ureters and we interfere with the paravesical part of the ureters. In the majority of these cases we encounter the development of a severe cystitis. All kinds of theories were advanced to explain this. I cystoscoped such cases before and after, and was sure there was no cystitis before the operation. I found that the cystitis always began around the ureteral openings, thus making it probable that interference with the nerve ganglia that are located near the vesical

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part of the ureter in the mucosa, leads to nutritive disturbances, thus furnishing a soil for the settlement of pathogenic germs.

DR. GRANVILLE MACGOWAN, of Los Angeles: I have been very much interested in both of these papers. The treatment of colon bacillus infection of the bladder and of the kidneys is certainly one that has tried the patience of every surgeon who has been called upon to have much to do with it. I am very glad to get a remedy for local use which promises such excellent results. Like Dr. Hunner I have placed my chief reliance upon nitrate of silver. However, I think, with Dr. Kolischer, that there is no remedy that will cure these cases without some reference to the cause. We know the colon bacillus can get into the pelvis of the kidney only from one of three sources: it must come through the blood stream; through the tissues from a stagnant fecal collection in the ascending or descending colon; or it must come up the ureter after the surgeon or widwife has carried it into the bladder on an unclean instrument. No bacillus, no matter what it is, if placed in an entirely healthy bladder or kidney, will grow there and produce trouble unless there is some obstruction to the urinary stream. The large majority of these cases of colon bacillus infection are cases in which there is obstruction in the urethra, male or female, by the presence of acquired stricture, by the presence of a growth, by the presence of a verumontanum which is enlarged, or by the presence of stricture which is there at birth, because these strictures do occur, sometimes in women, often in men. I do not believe that the colon bacillus will obtain permanent lodgment in the pelvis of the kidney unless there is obstruction in the ureter. Obstruction may arise from œdema of the mouth of the ureter, from the presence of stone, from the presence of a growth, from a kink of the ureter, from a stricture or from an abnormal blood vessel which catches the ureter and slowly obstructs the urinary stream. Now in any of these cases except that of œdema I do not believe that with the use of nitrate of silver one is going to cure a pyelitis that is present, nor do I believe that you are going to cure such a pyelitis with an injection of acetate of aluminum alone. The principal thing is the drainage. By the introduction of a catheter up into the pelvis of the kidney you obtain, at least temporarily, according to the size of the catheter that is used, more or less stretching of the stricture. Relief will follow the drainage and lavage. If the dilatation of the pelvis is situated as Dr. Hunner has represented,—and I have met in my experience with tuberculous kidneys and pyelitis several cases quite analogous to that

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reported here by him, — I do not think that any irrigation of the kidney pelvis or stretching of the ureter will cause a permanent cure. That looks to me like a purely surgical case that can only be cured by removal of that portion of the kidney. As Dr. Kolischer says, these injections simply change the soil; they cleanse and they drain, and when we have dilated the ureter and urethra, and have removed the obstruction which causes the slowness of the stream, or in women have restored the vagina so that proper support is given to the trigonum, I for one am glad to get hold of a remedy which will aid in the surgical cure.

DR. JOS. L. BOEHM, of St. Louis: I have been interested in the therapeutics of aluminum acetate for several years. In 1899, while suffering from a severe case of dermatitis solaris, I used a solution of aluminum acetate, which was soothing and emollient in its effect, when all other external applications had caused me much suffering. From that time to the present I have been constantly using it, both externally and also as a lavage medium for urethra and bladder. However, I have never administered it internally.

While I do not want to talk disparagingly of the splendid efforts of Dr. Koll, still I believe this subject is one more of physiological chemistry than of urology. When an acetate is taken into the alimentary tract what happens when it is split up into end products? Does it really remain an acid salt, and does it really raise the acidity of the urine? When we drink lemonade, the citric acid therein being closely akin to acetic acid, we know that the critic acid is very soon changed in the alimentary tract and no longer remains an acid. The same thing may just as readily occur with the acetate salt. Burrow's solution, used in dermatology, is a solution of acetate of aluminum, made by mixing acetate of lead, alum and water. A white precipitate is thrown down in this mixture, the aluminum acetate remaining in solution, which is decanted from the precipitate.

I would have to be shown whether the acetate of aluminum given per orem raises the urinary acidity. I should think a strict observation should be kept on the patient's diet while administering this salt, especially in colon bacillary infection, so as to exclude other things tending to raise the acid index of the urine.

Another point in reference to the colon bacillus: In my experience with bacteriuria I have found in many of my cases a combined infection with other pathogenic organisms. There

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is no doubt that the gonococcus, by producing trauma, offers a ready avenue for the lodgment of colon bacilli in the urinary tract. In a recent case of perineal abscess, with pyelitis, I found a triple infection of gonococcus, staphylococcus and colon bacillus.

The colon vaccine in my hands has been practically useless in colon pyelitis. I should like to hear Dr. Koll's experience with the vaccine.

In regards to the second paper, I heard nothing mentioned by Dr. Tenney as to a condition of so-called idiopathic renal hematuria. Does such a condition really exist? I have seen two cases probably of such a nature during the last year, and I came here to be enlightened on this point.

DR. HUGH CABOT, of Boston: I want to express my obligation to the gentlemen who have written these papers, because I have obtained a good deal of important information and many valuable suggestions. I am in sympathy with the views expressed by Dr. Hunner in regard to the reaction of the urine in these colon bacillus cases. I cannot remember a case in which the fresh urine containing a pure culture of the colon bacillus was anything but acid in its reaction, and I had come to regard that as rather an important diagnostic point in which the colon and tubercle bacillus stand together. It is new to me that an alkaline reaction is at all common with a pure culture of the colon bacillus.

I am not quite as much of a therapeutic nihilist as Dr. Kolischer. I still cling to the hope that we shall obtain solutions of value to the urinary tract, and I look forward with eagerness to trying this solution. I feel, however, that it will probably not revolutionize our practice, that it is probably not going to perform miracles; but it seems to be based upon sound work and in the direction in which we should encourage our members to work.

I was interested in all of Dr. Tenney's paper, but must take exception to some of it. He took the view that it is permissible for us to treat renal tuberculosis by hygienic measures. That is unsound and dangerous. There is no evidence at the present time showing that renal tuberculosis ever heals except by entire destruction of the kidney. If that proposition is sound, it follows as a necessary corollary that it is our duty to remove all tubercular kidneys as early as a diagnosis can be made. The tendency to temporize is dangerous and I am sorry to hear it advocated in a society of specialists.

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DR. KOLL: It would take a great deal longer to answer the criticisms than it took to present the paper.

In regard to Dr. Keyes's question, in the twenty-seven cases cited, seven renal, eight of cystitis, and twelve of the urethra, there was a final uniform result. None of them have reported with recurrence. Yes, I have compared it in the cystitis cases with irrigations with silver nitrate, and found that in a great many cases the silver nitrate will relieve the symptoms, but will not get rid of the colon bacilli, and you frequently get recurrences.

Now, I do not for a moment advocate liquor aluminum acetate is a specific. I particularly said that twenty-seven cases do not prove anything. It is up to the urologists to further prove or disapprove whether it is going to be of any value in the future. As to the percentage of cases of non-gonorrhœal urethritis, there were in the twelve cases of urethritis four that did not give a history of gonorrhœa.

Answering Dr. Hunner's questions regarding the medium and reaction, in the intestinal tract above the point of greatest fermentation, as is well known, we have a strongly alkaline reaction from the pancreatic juice that is thrown into the small intestine, and here is the point of the greatest amount of growth of the colon bacilli. Now as fermentation proceeds along the intestinal tract acid is produced, and the feces have a weakly acid reaction as a rule. The fact that the colon bacillus in the test tube makes litmus acid is not due to the action directly of the colon bacillus, but due to the fact that there is a fermentation produced in the lactose, throwing down the casein, and that is what produces the reaction on the litmus. In the urines in which the colon bacilli have been found they are practically all weakly acid. I do not want to be misunderstood that they were alkaline. I find that the colon bacillus grows as well on weakly acid as upon weakly alkaline media. In those cases in which I found an alkaline reaction to the urine there were a great number of phosphates, so that in all probability this gave the alkalinity to the urine. I do not want Dr. Lewis to think that I said this was going to be invariably successful. I do not hope for such results, as Dr. Keyes himself has mentioned.

In those cases in which you have gotten a marked alleviation of your symptoms of the pyelitis and cystitis, I should like to ask whether any of you have made a culture of the urine to find out whether the colon bacilli were still there. If they are there I am afraid you will get a recurrence. The treatment should not cease until the urine gives a sterile culture.

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The frequency with which the irrigation should be used depends on the inflammation and the way the patients react to the introduction of the cystoscope. In no case has it been necessary to use the pelvic irrigation more than ten times extended over a period of four weeks. You have to judge according to the individual case. I have had the subacetate made up in half-gram tablets, and I give two of those three times a day, either before or after meals. I do not claim specificity for the solution of aluminum acetate in its action upon the colon bacillus. I do not see why we cannot have a pyelitis without obstruction. Probably it is always secondary in such cases, but I do not see why an obstruction should be necessary. It may be secondary, as I have cause to believe, in a number of cases of severe gastro-intestinal disturbances.

Before closing I should like to warn you against the preparation of the drug. Unless it is in the hands of a man who is very careful in weighing out the different ingredients you are going to get an excess of free acetic acid, which will cause burning and tenesmus, and it must not be used when it is more than a week or ten days old.

I do not lay much stress upon the internal administration of aluminum acetate. For that reason I have not tried it out on a sufficient number of cases to place any real foundation for the statement that the total acidity is raised. I know that the administration of the acetates produces an alkaline reaction in the urine. Now whether or not there is some splitting up that produces a greater acidity, I do not know, but I do not lay a great deal of stress on the internal administration. I tried to have the patients live on the same regime, and titrated the urine with sodium hydrate, using phenolphthalein as an indicator, for seven days, and then titrated seven days after the administration, and from this I figured that there was an increase of eighteen in terms of sodium hydroxide.

As to the preparation of the aluminum acetate: It is made of calcium carbonate, aluminum sulphate, and acetic acid. The precipitate that the doctor mentioned that is thrown down is not the acetate of aluminum, but the sulphate. The subacetate of aluminum which it finally changes into is insoluble and inert. That is one reason why I mentioned that the solution should not be used when it is more than a week to ten days old, because you may get an acetate that will become an insoluble subacetate, with more or less free acetic acid, which will produce bad results. I have had no results whatever with vaccine treatment.

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DR. TENNEY: Some of Dr. Keyes's remarks were well answered by Dr. Kolischer. It is absolutely true that we are not going to cure or even relieve all our cases of pyelitis and pyonephrosis by removing obstructions to the free outflow from the kidney, because many of them, before they come to us, have passed the stage where such measures will suffice. I agree with Dr. Keyes that the process is back of the pelvis,— actually in the kidney in most cases, — and that is what has made me dubious about trying lavage of the pelvis.

I think every one of us has seen the pyelonephritis of pregnancy relieved by the termination of the pregnancy, and the pyelonephritis of ureteral stone and urethral obstruction disappear after the passage was cleared. As we learn to recognize and remove obstructions early we shall prevent infection in some cases, and provide sufficient drainage for recovery in others. It will be some time before the public and the rest of the profession will send every case to us early enough for these measures to supplant nephrectomy and nephrotomy.

It does not seem to be necessary to add anything to the paper as read to show our belief in nephrectomy for tuberculosis of the kidney as we usually see it. The early case without marked thickening of the ureter or urinary symptoms is seldom recognized, and I doubt if many here would advise an immediate nephrectomy on such a case even if an occasional acid fast bacillus could be found.

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CYSTO-URETHROSCOPY. A STUDY OF THE NORMAL AND PATHOLOGICAL POSTERIOR URETHRA.

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NEW YORK.

In previous publications I described a new cysto-urethroscope by means of which it is possible to obtain pictures of the neck of the bladder and posterior urethra, which are both upright and free from distortion. Having employed the instrument in more than five hundred cases, including both private and polyclinic patients during the past two years, it seems to me that a report of my own experiences may be of some value in stimulating further investigation along these lines. In the exposition of my subject I shall devote myself to the following themes: (1) anatomical landmarks; (2) elementary principles underlying the use of the instrument, and technic; (3) the normal pictures of the neck of the bladder and posterior urethra; and (4) pathological lesions.

Anatomy. In order to facilitate localization of the findings obtained by cysto-urethroscopy, it is expedient to divide up the posterior urethra in an arbitrary way, taking certain well-defined landmarks, such as the annulus urethralis, or margin of the internal sphincter of the bladder, and the colliculus seminalis, in determining the extent of each portion. The subdivisions that I have found must useful in practice are the following: —

The Sphincter Margin (*M*) with superior (roof),

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inferior (floor), and lateral portions (sides): the *pars prostatica* and the *pars membranacea* (*B*) (Fig. 1).

We divide the prostatic urethra into: —

A. Supramontane portion between sphincter margin and colliculus, with a roof, lateral walls (sides) and floor (*U*).

B. Montane portion with a roof, sides and floor (*T*).

The floor of the supramontane portion shows the fossula prostatica (*FP*). and the floor of the montane portion contains the colliculus, urethral crest and lateral sulci (sulci laterales). If we regard the complete ridge or verumontanum as the urethral crest, or crista urethralis, it seems best for topographical reasons to distinguish the following parts. Posteriorly (towards the bladder) there are frequently a number of small bands that lie in the fossula prostatica and pass in to the crista urethralis. These shall be called posterior frenula. They belong both to the supramontane portion and to the montane. The crista shows a posterior gradual inclination (crista posterior) or declive, (*S*) a central prominence, or summit, and the anterior distal slope, the acclive (*R*). We shall drop the term urethral crest and speak only of a colliculus showing a *summit*, *acclive* (anterior crista) and *declive* (posterior crista). The valleys on either side of the colliculus are the *sulci laterales*.

The membranous urethra (*B*, Fig. 1) sometimes receives the terminating fold of the acclive and anterior crista, and also has a roof, side walls and floor.

THEORETICAL AND TECHNICAL CONSIDERATIONS.

I need not dwell here on the theory involved in the development of the cysto-urethroscope, for this has been already described elsewhere.[1] It will suffice to note a few fundamental facts. It is to be

[1] *Amer. Journal of Surgery*, May, 1910.

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remembered that in our optical system, a prism is employed by virtue of which upright and right-angled images are obtained. It may be well to say here, that the deflection of the rays of light is not quite 90°, so that the telescope looks slightly forward. Theoretically there is a certain advantage in a slight obliquity of the axial ray, for the center of the area of illumination and the middle of the field will then coincide. In the interpretation of the pictures, however, we can disregard this slight deviation from the canonical displacement of 90°.

As for the size of the field, this is determined by the size or width of the fenestra when the mucous membrane is in contact with it. As the mucous membrane falls away (which occurs whenever there is a fossa, or which is artificially brought about by the injection of fluid) the size of the actual field increases, just as in the case of the cystoscope. Thus the diameter of the field will vary from 4 to 7–16 of an inch. By the adoption of an optical system of short focal distance and of but meager magnifying power at close range, it was found that the author's cysto-urethroscope possesses that much desired quality of being able to bring properly into view objects lying very near to the prism. In addition to this advantageous feature we employed a form of illumination that is excellent for near work, namely a prismatic roof illumination.[1] In the cysto-urethroscope, therefore, we have conditions which are admirably fitted for the investigation of near objects, making it possible to see the minutiæ of the markings of the mucous membrane with great distinctness. In the male but a limited portion of the mucous membrane

[1] In more recent models the prism has been substituted by an obliquely placed lamp shedding its rays through a glass window. Either type of illumination (prism or direct variety), has been found satisfactory. The deflectors also have been replaced by a permanent deflecting mechanism similar to that which is used in the cystoscope.

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of the bladder can be brought into view. No difficulty will be encountered in locating the ureters and in studying the whole of the trigone. The sphincteric margin can be perfectly studied, but there are portions of the juxta-sphincteric mucous membrane (namely that portion which lies in the bladder) that may escape our observation. This is especially true as regards that portion of the mucous membrane of the bladder which adjoins the roof of the sphincter. It is because of our inability to depress the penis sufficiently, and consequently of our inability to approximate the fenestra and the mucous membrane in question, that the failure to bring this portion into view results. In the female, on the other hand, the shortness of the urethra makes it possible to make wide excursions with the cysto-urethroscope and the instrument becomes a better one for vesical observation. For practical purposes it is quite sufficient to be able to see the trigone, ureters and sphincter.

Although we regard the simultaneous employment of the author's right-angled telescope together with the irrigation method (Goldschmidt) as affording us the most accurate pictures of the posterior urethra, we must admit that even this combination may permit the tyro to misinterpret some of the pictures. Thus, although the prismatic illumination is adequate for near objects, the more remote objects, such as the dilated bladder mucosa, remain insufficiently lighted. When the bladder is somewhat distended and the fenestra is at the sphincter margin, the failure to illuminate the bladder is shown in Fig. 6, where the upper dark zone corresponds to the mucosa of the bladder and the lower light portion represents the sphincteric margin and beginning of the supramontane. In practice this restricted lighting property is not a disadvantage, since the optical apparatus too is best adapted to near objects.

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Although we believe that the colors seen with the telescope of the cysto-urethroscope equal in exactness of reproduction those seen with the ordinary cystoscope, certain changes may be produced by the pressure of the instrument, by spasm on the part of the bladder neck and by prolapse of the urethral mucous membrane. Thus, as the instrument is drawn into portions of the urethra which are narrow, the pressure effect upon the mucous membrane becomes at once manifest, and we can see the mucous membrane become blanched and the capillaries and vascular streaks turn pale. A little experience, however, will tell us at once when the pallor is a true one, for it requires but slight manipulation or holding of the instrument at rest for a moment to bring about a return of the vascular flow and a restoration of the normal color.

As for prolapse of the mucous membrane, this takes place most readily in the region of the colliculus, when it is turgid or when it is inflamed. It occurs in the bulbous urethra, when irrigation is stopped, or when one of the faucets is open. Any marked redundancy of the mucous membrane coupled with an absence of distension by irrigation will tend to make the mucous membrane fall into the window of the instrument. If we take sufficient precaution to follow exactly the technic described later in the paper it will rarely happen that we are disturbed by prolapsing mucous membrane. Even if this does occur, vision is not altogether interfered with, increased magnification and slight darkening being the result.

In passing from the trigone over to the floor of the supramontane urethra, we must bear in mind that the sphincteric margin may be rather prominent. Owing to the declivity of the floor of the supramontane region, and also to the downward inclination of the

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trigone, slight variations in the appearance of the sphincteric and juxta-sphincteric regions will inevitably depend upon the differences in position of the instrument. Thus, if we depress the ocular considerably in viewing the floor of the supramontane region we may slightly transilluminate the sphincter margin, and the picture will change accordingly. Villous growths and hypertrophies in this region, therefore, must be studied from different points of view, the shaft of the instrument being made to follow the plane of the parts to be seen.

We need not dwell on the optical principles involved in the interpretation of the pictures seen with the cysto-urethroscope, for they are the same as those belonging to a Nitze cystoscope with an upright field. It is only for the region of the sphincter that a word of explanation may be advisable. Fig. 7 illustrates diagrammatically the floor, roof and lateral aspect of this region. The shaded areas represent the non-illuminated bladder, which appears in the upper part of the field when the fenestra of the instrument is turned downward. Although the floor of the sphincter presents a horizontal slightly convex line, the roof and side walls show marked concavities. In interpreting these pictures it must be remembered that when the fenestra looks down the far point of the field is at a point north (Fig. 2). On rotation of the cysto-urethroscope, the fenestra pointing to the right side of the patient, the far point is east. In viewing the roof the far point of the field is south, and looking at the left part of the sphincter the far point of the field lies at west. The concave lines, therefore, do not represent the curve of the urethra in a plane perpendicular to the shaft of the instrument, but they illustrate the sphincter margin in a plane parallel to the shaft. In other words, the concavities presented by the roof, side walls and floor

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are directed towards the bladder and not towards one another.

Technic. Inasmuch as this has already been discussed in a previous paper, I wish here only to allude to those improvements which have developed during the course of my practical experience with the instrument. After introduction with the obturator and irrigation of the bladder when the contents are turbid, the telescope is inserted and an irrigator, which is situated about three feet above the level of the table, is attached to one of the lateral faucets. The other faucet remains closed and is opened in order to evacuate the bladder. When we desire to bring about prolapse of the urethral mucous membrane irrigation is made to cease temporarily, or, to secure considerable prolapse, the discharging faucet may be opened for a moment. But a very small amount of fluid is allowed to enter the bladder, and we begin the examination of the empty bladder, noting, if we wish, the peculiarities of the case in hand, and studying the points that are to be described in a separate chapter. The flow is then again started and allowed to continue throughout the examination, being only made to stop for special reasons or while emptying of the bladder. If we do not care to study the collapsed bladder, we begin with the search for the ureters, which are usually easily found when the bladder is filled with but a small amount of fluid, viz., from 30 to 100 c.c. In some instances, when the bas fond is very deep, the trigone may be carried far downward on dilatation, making the finding of the ureters rather difficult. In such cases it is best to seek the ureteral orifices after having allowed most of the fluid to run out. The examination of the trigone is next in order, and during this process it is best to raise the ocular of the instrument so as to bring the fenestra fairly close to the mucous mem-

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brane. The scrutiny of the sphincteric margin is now begun; its whole circumference can be brought into view by simple rotation of the shaft. For observation of the juxta-sphincteric portions of the bladder, we should have very little fluid in the bladder, and carry the shaft of the instrument far in the opposite direction. We usually examine the floor of the supramontane and montane region next. This accomplished, the fenestra is pushed into the bladder, turned upward, and withdrawn for the examination of the roof of the supramontane, montane regions and of the side walls. The membranous urethra and bulb are the last to engage our attention. As regards the bulbous urethra, we must not lose sight of the fact that its capacity and dilatability vary considerably in different individuals; that when it is not distended its appearance is very rugous, and that when it is filled ad maximum it may lie so far away from the fenestra that the field becomes somewhat obscure. We must then manipulate the evacuating faucet as well as the irrigating flow in order to obtain the proper distance for most satisfactory observation. The sharp limiting margin marking the junction between the bulbous and penile urethra, as shown in Fig. 19,[1] will serve as a reliable landmark for the recognition of its peripheral boundary.

For those using the cyst-urethroscope for the first time, the following more detailed description of the various parts of the instrument may be of service: —

Familiarize yourself with the following parts before attempting to use the instrument: —

1. The Sheath (Fig. 3) with its Detachable Beak (*a*), Fenestra with Catheter Notch (*b*), Lamp, Illuminating Window (Fig. 4*m*), Irrigating Faucets (*d*), Coupling (*c*), and Locking Screw (*e*). Remove the

[1] The figures refer to the lantern demonstration.

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curved beak, inspect lamp and lamp socket (Fig. 4*g*). A short, straight tip may be substituted for the curved one. Keep the screw joint and beak anointed with the special wax provided for that purpose.

2. The Telescope (Figs. 4 and 5) with Catheter Channel (*k*), Catheter Outlet (*o*), Locking Fork (*p*), the Deflector for a Catheter (*y*) or high frequency electrode, the Filiform Deflector (*x*), and the Telescopic Joints (*j*), at the end of the telescope, for the reception of the deflectors.

For ureteral catheterization or fulguration, adjust the larger deflector, after having capped the catheter outlet with the proper perforated rubber tip. Place the deflector so that the catheter or electrode will emerge as near to the ocular end of the fenestra as possible. To probe the utricle and ejaculatory ducts use the finer curved filiform deflector. For observation alone, close the catheter outlet with a closed tip.

3. The Obturator, with Locking Fork (Fig. 3*f*). Technique.

A. Use ordinary cystoscopic preparations, and in sensitive individuals anesthetize the urethra with two per cent novocain or two per cent alypin solution. Employ: (1) A connecting tube for irrigation through one faucet. (2) An irrigator filled with boric acid solution situated three to four feet above the level of the patient.

B. Test the lamp, watching the illuminated ground-glass window. A great deal of light is not required, inspection being done at close range. Short-circuiting is prevented by keeping the screw joint of the beak smeared with wax. Adjust deflector according to requirements. Note that the deflectors may cut off a tiny part of the field.

C. Introduce instrument with obturator into the bladder; remove obturator.

D. Wash bladder, if necessary, through sheath.

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E. Insert telescope; adjust connecting tube to one irrigating faucet, both faucets being closed.

F. Inspect the collapsed bladder. Start the flow and examine trigone, ureters and vesical sphincter. After the sphincter has been examined proceed to the inspection of the floor of the prostatic urethra, and then view the roof and side walls.

If the telescope becomes soiled with secretion, remove and clean it without disturbing the position of the sheath. The distended bladder may be emptied at any time through the other faucet, after pushing the instrument inward so that the fenestra lies in the bladder.

N. B. On the Management of the Deflectors.

Try the deflectors before introducing the sheath. If they slide into the joints too easily, spread the two limbs. Adjust in the proper position so as to get maximum deflection. This is obtained by giving the deflector a slight bend so that it tends to spring away from the telescope. Make a mental note of the proper position by observing just how much of the field (if any) is obscured by it. Usually only a minute section of the field is encroached upon; sometimes not any of the field is cut off.

On the Management of New Model Cysto-urethroscope.

In this model the telescope carries a deflecting mechanism which is a miniature reproduction of that used in catheterizing cystoscopes. The special deflectors are not necessary in this type of instrument and bougies, fulguration wires, or catheters may be easily directed by the mere turn of a thumb screw.

The Empty Bladder.

A splendid opportunity for studying the movements of the walls of the bladder, as well as for

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viewing the normal configuration of the parts about the vesical orifice, is afforded us by reason of the instrument's capacity for producing reliable pictures in the presence of a minimum amount of filling fluid. Thus the form of the *orificium interum* can be investigated in the case of the empty bladder just as well as with varying degrees of distention of the organ.

It is in the collapsed state that the physical conditions are such as to permit of a rather extensive view of the mucosa, with minimum excursions of the instrument. As has already been pointed out elsewhere, the evacuation of the bladder offers a means of bringing into view parts which would be beyond the pale of the visual capacity of the optical system.

Let us now turn our attention to a few of the typical pictures of the orifice of an empty male bladder. Keeping the sphincteric margin in the center of the field we see only the red trigone. A slight push inward will reveal a different view, the trigone being below and the pale bladder mucosa encroaching upon and overhanging it in an oblique fashion (Fig. 8).[1] On passing deeper inward, in the direction from before backward, the obliquity of the folds of the prolapsing roof is lost until their margins become almost parallel, enclosing an oblong strip of plicated dark-red trigonal mucosa (Fig. 9).

In order to avoid possible misconception, it may not be amiss to emphasize the fact that in the interpretation of views of the bladder, obtained with the cysto-urethroscope, the displacement produced by the instrument must be taken into account. Thus in the Figs. 8 and 9, showing two bulging walls that appear to overhang the floor of the bladder, careful consideration reveals the fact, that we are not dealing

[1] Figures refer to the lantern demonstration.

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with two distinct side walls, but with a protrusion of the roof. For instead of meeting the trigone the collapsed vertex is moulded around the shaft of the instrument. The roof of the bladder, therefore, is practically divided into two lateral portions as long as the instrument looks down upon the floor.

Turning 15° to 30° to the right or left from the primary position (which showed the inferior margin of the sphincter), the line representing contact of the roof of the bladder and sphincter is brought into view (Fig. 10). Often there is a single convex wall of pale mucosa meeting the red sphincteric ring, but at times we encounter an additional intermediate fold intruding into the angle between sphincter and bladder.

On rotation of the cysto-urethroscope to either side (with an added motion of translation, in the form of a slight withdrawing pull) we see that the sphincter margin is covered by the prolapsed roof. Still turning the instrument in the same sense, the typical angular superior margin is encountered, the triangular incisure being covered by the bulging pale roof of the bladder (Fig. 11). It would appear from an analysis of these illustrations that the vesical roof falls downward and forward on the internal orifice, meeting the trigone. Under normal conditions it covers the bladder surface of the sphincter or the annulus urethralis. In some cases, two lateral projections insinuate themselves at points on either side of the internal meatus. With the instrument *in situ*, a certain distortion is inevitable, leading to the production of the pictures just described.

THE SUPRAMONTANE REGION.

Although it is difficult to set an exact peripheral limit to the supramontane portion, it is expedient to describe the anatomical features of this region separately, because it differs so strikingly from the

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montane portion both in the pathological lesions and in the distinguishing topographical landmarks.

The floor presents a picture quite distinct from that of the lateral wall and roof. Its markings seem to be prolongations of those of the trigone. Usually the floor takes a decline downward from the sphincter margin towards the periphery, terminating in a small depression, which we call the *fossula prostatica*. The mucous membrane of this region is of a deeper red than that of the roof and sides of the sphincteric margin. The reason for this is evident when we remember that at the margin the transition into the bladder occurs. At the sides and roof the bladder is pale, and at these situations the sphincter margin shows rather a transition from pale vesical to red urethral mucous membrane. At the floor of course this change is absent, the trigonal mucous membrane being of a deeper red. As for the markings, we usually find longitudinal vessels which show a tendency to converge towards the periphery, taking their source from the sphincteric margin and passing towards the fossula prostatica. Although in most cases we find a perfectly smooth, thin mucous membrane which seems to be tightly adherent to the musculature and connective tissue of the sphincter, certain cases present redundancy of mucous membrane, so that slight longitudinal folding takes place (Fig. 12). It is in the cases where this plication occurs that we are also more apt to find a deeper excavation of this region, so that instead of a gradual transition from trigone into floor of pars supramontana we see a change into a deep valley, at the bottom of which there are longitudinal folds. Although we must admit that the placing of lateral limitations to the floor of the supramontane region is rather arbitrary, it is not difficult in some cases to recognize the side walls, for they may be strikingly prominent. In other cases, how-

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ever, the change into the side walls is not abrupt, but takes place in the form of a gradual curve.

The side walls and roof present nothing worthy of note. The roof sometimes shows longitudinal vascular striations which are somewhat paler than those of the floor, but at other times these are not apparent, and there seems to be a network of irregular larger vascular channels which lie in slight elevations of mucous membrane.

In practice it is also expedient to keep in mind the fact that the supramontane region contains a distal and a proximal portion. The proximal part or beginning of the posterior urethra corresponds to the true internal sphincter. Under the mucous membrane lies the strong muscle which closes the bladder. It is not surprising, therefore, that the mucous membrane here should show some variation from the peripheral part, or that which is included in the prostate. The mucous membrane or sphincteric portion is apt to show a deeper red, whereas the peripheral or prostatic part becomes paler and smoother. Distally, the floor of the pars supramontana contains the fossula prostatica, in which lie the posterior frenula. The latter are tiny ridges which pass backward from the foot of the declive, diverging as they are traced backward towards the sphincter. These ridges vary both in number, in size and inclination. Sometimes there are only two, at other times as many as five can be made out. In the normal urethra they have a sharp summit, whereas in pathological conditions their tops become rounded. From their general appearance one gains the impression that a cross-section of these bands would often be triangular in shape.

In the examination of this region it is important to obtain adequate illumination. When the fossula prostatica is very deep, the amount of light diminishes.

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We overcome this by the expedient of raising the ocular of the instrument and pressing the fenestra against the floor of the urethra. If we use only a moderate amount of light, relative brightness of successive fields gives us an indication of the distance of the mucous membrane from the fenestra. Thus,[1] as soon as we meet with a fossa or a sharp decline in the level of mucous membrane, a diminution in the intensity of the light occurs. This is well illustrated when we pull the instrument out from the sphincteric margin towards the fossula prostatica. The downward[2] obliquity of the floor of the pars supramontana then becomes evident, although it is not marked in all cases. When a great deal of light is employed, these fine nuances are not in evidence.

Fig. 6 shows the typical floor of the sphincteric margin with the beginning of the pars supramontana. There is a dark area above, which corresponds to the non-illuminated bladder. The sphincteric margin shows a slight prominence in the center, which has been termed by anatomists "uvula vesicæ." The longitudinal and slightly converging vascular striations are well shown. Whereas this figure shows the type of floor of pars supramontana in which there is no abrupt transition into the side walls, Fig. 12 shows quite a different picture. Here we would gain the impression that there is a hypertrophy of the side walls, such as occurs in prostatic enlargement. The figure shows the two prominent and bulging lateral walls and a central valley, the floor of the supramontane portion, with a number of longitudinal folds. In my own experience this type is infrequent, although a very slight protrusion inward on the part of the side walls is seen in a fairly large number of cases.

[1] If too much light is used, these facts cannot be appreciated.
[2] When the patient is in dorsal decubitus.

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It is at the level of the fossula prostatica that we begin to meet with the larger, plainly visible prostatic ducts. Although these are not always apparent, we are apt to encounter them if we examine closely the depressions between the posterior frenula at the foot of the declive. The posterior frenula are well shown in Fig. 13, where they are so prominent that they obliterate the fossula to a certain extent. At the foot of the declive and even posterior to this, we find slit-like openings, veritable foveæ, which at times are hidden by the adjoining ridges. They can be best demonstrated by allowing the irrigating fluid to suddenly distend the urethra. By means of a fine filiform bougie we can probe these ducts. However, they are usually so small (except at their orifice) that the bougie will but enter a millimeter or two. In the normal urethra the fossula has a pale yellowish, red color. The longitudinal or converging striations of the floor of the pars supramontana do not occur, but, instead, we see very fine vessels. At times this region is completely bald and it is difficult to make out any vestige of ridge-like structure. If we rotate the instrument at this particular level so as to take in the roof, we will find a striking difference between the distal part of the roof of the pars supramontana and the vesical portion. Whereas the latter partakes of the same red color that is so characteristic of the floor of the vesical sphincter, the distal portion becomes suddenly smoother and paler, and a tendency to transverse folding makes itself apparent. Here there are no distinct vascular markings, and there may simply be a fine network of vascular channels.

THE MONTANE REGION.

Let us now turn our attention to the montane region, which is, perhaps, the most interesting part of the posterior urethra. We have already referred to

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the subdivision into a floor with its colliculus and the sulci laterales, two lateral walls and a roof. The colliculus has a summit, a posterior portion, or declive, and an anterior portion or acclive. It is in this region that we meet with the greatest diversity in the configuration of the parts, although lesions are no more frequent here than they are in the supramontane portion. After having examined a large number of cases, we are soon struck by the fact that the relative size of the colliculus varies greatly. Not only this, the general shape of the region is subject to variation, in so far as it may sometimes show a deep concavity, and at others seems to be filled by the verumontanum and side walls. This fact is in part to be explained by the great vascularity of the colliculus, and its tendency to become turgid upon very slight irritation. This, however, is not always the case, and there are undoubtedly cases which present quite an excavation in this region, and others in which considerable dilation is necessary to unfold the parts.

Turning our attention to the colliculus itself, we must point out that there is no fixed type, since the normal may assume a number of the different forms that will be now described. In interpreting the pictures obtained with the author's cysto-urethroscope, it must be remembered that only a limited portion of the urethra is brought into view at once. The size of the field will, of course, depend upon the distance of the mucous membrane from the fenestra. Thus, it is only in cases of small colliculus, or when the posterior urethra permits of considerable dilatation, especially in those instances where we meet with a considerable excavation, that the whole of the verumontanum is brought into view in one field. When viewing the fossula prostatica we are apt to see only the declive and the summit of the colliculus, and the acclive can also be made to occupy one field. Fig. 14

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shows a very common type of colliculus seen from above and in front. The typical rounded summit is well illustrated, and one of the forms of utricle orifice is also shown. Not very far below the top there is a depression, the orifice of the uterus masculinus. This leads backward for a distance of a few millimeters to a centimeter or more. The ejaculatory ducts are not to be seen. The slope of the acclive is rather sudden. Commencing by a fine tapering extremity in the membranous urethra, the urethral crest broadens in a triangular fashion as it ascends, becoming the acclive of the colliculus. Another not unusual form of colliculus is shown in Fig. 15, where the ejaculatory ducts are prominent and lie to either side of the centrally placed utricle. Here all three openings are vertical[1] slits, lying in mucosa that seems to pout at their immediate site. Frequently fine tortuous vessels can be seen to cross over the declive and summit, passing between the orifices, as depicted in the figure. A similar disposition of the ejaculatory ducts and utricle is represented in Fig. 16, where, however, the prominent orbicular arrangement of the mucosa around the ducts is even more striking. Being seen from a point farther back, more of the declive comes into the field, and at the top of the picture several of the frenula make their appearance. Coursing over the surface of the declive we can see a bifurcating tortuous vessel. Whereas the smooth surfaces shown in the previous figures are indications of normal structures, we may at times meet with colliculi whose summit and acclive show a somewhat bosselated appearance. It is true that bulbous change and knob-like hypertrophies are, as a rule, indications of pathological processes. This shall be referred to later. In Figs. 17 and 18, however, two varieties of

[1] Vertical in the picture, but, in fact, running obliquely and more or less sagittally.

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colliculus are shown in which the rounded contour of the previous type is missing. Although there was no reason to assume here that this peculiar variation was due to previous inflammatory process, Fig. 17 shows a pyramidal type of colliculus that is anomalous, but not pathological. In the upper part of the field there are indications of the posterior frenula lying in the darker fossula prostatica. The utricle, too, presents a rather large umbilicated form. This type of orifice is not at all uncommon, particularly in those instances where it is difficult to find the ejaculatory ducts. It would seem that here the ejaculatory ducts and utricle open into a common receptacle. If we examine the utricle orifice closely we find in these varieties a marked overhang above and a distinct ring-like depression which is somewhat oval with the long axis vertical. At its center there is a smaller bulbous protrusion, as in a navel. Another colliculus with irregular contour and with an odd form of utricle opening is depicted in Fig. 18. Here the umbilication is still more pronounced, there being two bulbous bodies instead of one. The ejaculatory ducts open into a common fossa. In the contracted and empty state the color of the colliculus is a pale yellowish red. Under ordinary circumstances the declive and summit or the acclive and summit can be brought into the field at the same time. It is only in cases of very small colliculus in prostatic hypertrophy and in the excavated type of prostatic urethra that a large portion comprising the whole of the colliculus, and possibly a portion of the fossula prostatica, can be seen at the same time. By means of dilatation with fluid we can also bring into view a portion of the sulci laterales, although for a perfect examination it is best to turn the instrument to one or the other side in order to expose the finer details of the region. It may happen during the examination the colliculus

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will suddenly become enlarged, making it necessary to inject fluid under greater pressure in order to obtain a proper view. As for special markings, it is only the orifices above described that can usually be seen. In some instances, however, very minute prostatic ducts can be found emptying in the region of the acclive. Normally the declive shows a pale homogeneous mucous membrane, with fine capillary vessels.

The Sulci Laterales. As has already been said, these are best seen when the colliculus is small and in the excavated type of posterior urethra. However, the study of these two valleys is always easy when the instrument is turned somewhat to the side and the fluid is flowing. Their depth varies considerably in different cases. The transition from the floor to the side walls may be either in the form of a concave wall or there may be an abrupt ascent in those instances in which the lateral walls are swollen or have a tendency to prolapse. It is in these sulci that we find a number of prostatic ducts varying from two to one half dozen, sometimes in the form of tiny, slit-like openings, and more frequently having a punctate shape. The mucous membrane here is also of a pale reddish yellow, and the vascular markings are in the form of irregularly longitudinal streaks and tortuous delicate vessels. When there has been no previous pathological process the mucous membrane is smooth, and apparently thin, without any folds. At the junction between the floor and side walls we are apt to encounter the slit-like orifices, whereas the rounded openings are more frequently found in the sulci themselves. The tortuous vessels course for the most part in an oblique direction, passing backwards and upwards along the side walls.

As for the side walls, these offer very little of interest. In most cases there is a fairly abrupt rise from

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the sulci, and in other cases there is a concavity which is somewhat deeper red than the floor. When the urethra has been free from inflammatory process, the delicate vessels seen in the sulci are found to interanastomose with similar vessels on the side walls or continue directly upward on these walls. Attacks of gonorrhœa cause these markings to disappear and leave irregular vascular streaks in their stead. The roof is devoid of any characteristic markings, and is usually much paler than the lateral walls.

The Pars Membranacea. As the instrument is withdrawn from the montane region with the fenestra turned downward, the acclive can be followed by its tapering crest into the membranous urethra. The longitudinal markings are very distinct, as a rule, parallel or slightly converging vascular striations passing at the side of the anterior crest and gradually becoming lost in the floor of the membranous urethra. The membranous urethra itself is smooth and the mucosa looks thin, the floor is yellowish red, whereas the roof and sides are somewhat paler, almost grayish white.

The delicate median ridge of the acclive, as it becomes lost in this portion of the urethra, often shows a striking pallor at its summit or middle, due partly to the pressure effect of the instrument and possibly also to an avascular condition of the part.

On either side of the disappearing anterior crest we see the continuation of the vessels of the sulci laterales, and observe how they take a longitudinal direction. The roof and sides of this region present nothing of note and are practically devoid of markings.

The Bulbous Urethra. Whereas every detail of the sphincteric margin, the pars supramontana, the mon-

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tane portion and the pars membranacea can be thoroughly scrutinized without the exercise of special maneuvers, the bulbous region (Fig. 1A) may offer some difficulty owing to its distensibility and the depth which it occasionally assumes. It is in the examination of this part that some skill is required in the manipulation of the irrigation fluid. We must be able to displace the mucosa at one time, and at another produce prolapse in order to obtain a sufficiently clear picture in some of the cases. Thus, the pars bulbosa may be so large that when distended with fluid, its distance from the fenestra and lamp is considerable, and illumination becomes diminished. This can easily be overcome by opening the second faucet of the instrument and evacuating some fluid, or by stopping the flow. The floor of this part presents a corrugated or folded appearance, the color being somewhat deeper red than of the parts above. As a rule no ducts can be found. The roof and sides do not present the same folded appearance. A useful and interesting distal landmark is afforded by the junction of the bulbous and penile urethra shown in Fig. 19 (and marked *J* in Fig. 1). The transverse margin with the illuminated mucous membrane below presents the beginning of the penile urethra. On either side the folded lateral wall and part of the floor of the bulbous urethra are seen, and the central upper dark region represents the non-illuminated distended bulb. Although the junction is not always so abrupt it is usually very well marked. In a certain number of individuals the proximal limit of the bulbous urethra is indicated by a distinct transverse ridge or a few folds that occupy the floor and part of the lateral walls of the urethra. These ridges may be conspicuous or just barely discernible. In favorable cases, then, the boundaries of the bulbous urethra are sharp, making estimation of its extent easy. The

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relative size of the bulb can be determined, as a rule, by a glance through the instrument.

The Sphincter Margin. In the chapter on the interpretation of pictures seen with the cysto-urethroscope we already alluded to the explanation of the views here obtained. It is not easy to define the exact limits of what is included in the term "sphincteric margin." Properly speaking, we should consider three distinct portions. First, the vesical part, which properly belongs to the realm of the right-angled and retrograde cystoscope; second, the true margin or ring; and third, the urethral portion. Owing to anatomical conditions it is impossible in the male to obtain a satisfactory view of that portion of the roof of the sphincter which lies in the bladder — namely, the juxta-sphincteric part of the bladder. The margin can be perfectly seen throughout its circumference. Our inability to depress the ocular of the instrument sufficiently makes it impossible to approximate the window of the instrument and the roof of the bladder near the sphincter sufficiently to obtain a proper vision. On the sides, however, this is easier, particularly if we allow the bladder to collapse. In viewing the inferior aspect of the vesical portion of the sphincter we encounter no difficulty, for the transition from trigone to floor of the vesical sphincter is a gradual one, and there is no sudden drop or sudden concavity such as is characteristic for the roof and sides (Fig. 20). In the female these obstacles do not obtain, the urethra being short and the instrument having perfect freedom of motion. An adequate view of all that portion of the bladder which adjoins the margin of the sphincter can easily be obtained. In other words, in the female a retrograde instrument or retrograde

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cystoscope can be readily dispensed with when we have a cysto-urethroscope at our disposal.

In practice it is best to disregard the adjoining bladder from a consideration of the sphincter margin, and to consider the beginning of this region as being that ring which goes to form the internal orifice. This is readily brought into view when, in the slightly distended bladder, the cysto-urethroscope is gradually pulled out until a sharp illuminated margin comes into full view. The picture of the floor of this region is so different from that of the sides and roof that it merits special description. Fig. 6 illustrates well the normal floor of the sphincteric margin. In the upper part of the field a dark area is seen, which is the non-illuminated bladder. Below this we see the beginning of the floor of the pars supramontana and a slightly convex margin, the internal orifice or floor of the sphincteric margin. Usually this line is slightly convex or almost flat and horizontal, but at times we see a central projection which corresponds to what the anatomists have called the "uvula vesicae." The color of this part is a fairly deep red admixed with yellow, and the vascular markings run in a longitudinal direction, with a tendency to converge towards the urethra. In the normal state, the mucous membrane is smooth, without any visible duct orifices. As a rule the transition from this margin into the side is gradual. In a few cases we have noticed a sudden change into the side walls, the junction being marked by deep lateral grooves. It is not alone in color, vascular markings and contour that the floor of the sphincter differs from the sides and roof. Whereas the roof, and to a less degree the sides, pass into the bladder by a sudden concavity, the floor presents a gradual slope down towards the trigone, and distally too there is a gradual decline towards the fossula prostatica.

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Fig. 21 shows the right side of the sphincteric margin. The absence of vascular markings is striking, and the color too is quite different from that seen in the floor. The red margin is replaced by a pale pearly line, which imperceptibly changes into a deeper red, the beginning of the supramontane urethra. A slight concavity is the rule. The sides are usually counterparts, but the roof of the sphincteric margin often presents a more acute angle. Although a concavity is the rule, a sharp notch is not uncommon. In rare instances a few tortuous vessels cross along the sphincteric margin, even at the sides and roof. Sometimes a reduplication of the sphincteric margin seems to occur (Fig. 22). Close scrutiny, however, makes it apparent that in such instances we are dealing with a slight prolapse of the adjoining bladder mucosa.

If we rotate the instrument at the level of the floor of the sphincteric margin with the border of the sphincter occupying the middle of the field, we will note that a smaller amount of the lateral aspect of the sphincter comes into view. As for the roof, this may just skirt the field or fail completely to come into view. In this way we ascertain that the annulus urethralis, or internal urethral orifice, does not occupy a vertical plain, but has a slight inclination from above, downward and backward, when the patient is in the dorsal decubitus. The amount of obliquity varies. It is necessary, therefore, in examination of the sphincter to draw the instrument out a short distance, as we scrutinize the sides, and to pull it out still further for the roof. This anatomical peculiarity can be best demonstrated when the bladder is almost empty.

PATHOLOGICAL LESIONS.

It is not my purpose here to give a comprehensive account of the pathological lesions found in the neck

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of the bladder and posterior urethra, for my material examined up to the present writing is not sufficient to explain all the doubtful findings, nor have I been able to satisfy myself regarding the nature of all of the lesions encountered. It seems best, therefore, to allude only to those changes which were seen often enough to leave no doubt as to their nature. The superiority of the cysto-urethroscope in diagnosticating the finer and more minute lesions of the trigone, especially near the sphincteric margin, has already been referred to elsewhere. The so-called *cystitis colli* gives a most remarkable and beautiful picture.

Fig. 23 shows the mucous membrane of the bladder just beyond the sphincter margin, with the cysto-urethroscope turned slightly to the right side of the patient. The small bulbous excrescences are well depicted. With the cystoscope these bodies are markedly enlarged, and the picture is very dark and distorted. We have here a very good example of cystitis proliferans, or papillomatosa, if we so wish to designate it.

We occasionally encounter papillomata at the margin of the vesical sphincter. Such a tumor is represented in Fig. 24. This papilloma springing from the left margin of the sphincter followed the removal of a very large villous tumor of the bladder by suprapubic cystotomy. Owing to the fact that the larger number of its villi were lying in the posterior urethra, it appeared only as an irregular shadow through the observation cystoscope. It was completely destroyed by means of the high frequency current[1] through the author's operating cystoscope.[2]

Inflammatory processes involving the floor of the sphincteric margin showed themselves not only in

[1] Reported by Buerger and Wolbarst: *New York Medical Journal*, Oct. 29, 1910.

[2] This instrument will be described in a future publication.

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the effacement of the longitudinal markings, but also in an increase of the depth of the red color, as well as in a general velvety appearance of the mucous membrane. Chronic inflammatory processes leave their traces in a hypertrophic condition of the mucous membrane, and in the production of folds which evidently represent submucous infiltration. Here too as well as in the supramontane region we encounter a bulbous hypertrophy of the mucous membrane which may simulate true cysts.

Although we not infrequently meet with a slight protrusion of the central portion of the floor of the sphincteric margin, it would seem to be either an anomalous development or a pathological lesion which would cause this part to be unduly prominent. This hypertrophy, if such we may call it, may be so marked that a beginner would be apt to take it for a hypertrophy of the middle lobe of the prostate. When it is present we can recognize it by the fact that the trigone takes a sudden drop downward from the sphincter, leaving almost an excavation behind the sphincteric margin. At the present writing I am unable to say what the significance of this hypertrophy is, for it seems to be due rather to a hyperplastic condition of the sphincteric muscle than to a thickening of the mucosa. Perhaps it is only an anomaly of the so-called *uvula vesicæ*.

Small white patches of mucous membrane indicate the sites of old scars. Such mucous membrane is very thin and is evidently bound by scars. The cicatrices may cause such rigidity that the passage of a sound causes distinct linear tears or cracks comparable to those seen in the cases of hard infiltration of the anterior urethra.

Supramontane Region. The sphincteric margin and beginning of the supramontane urethra is a favorite site of that proliferative condition of the

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mucous membrane which we may designate as urethritis proliferans or bulbous hypertrophy. Beginning at the sphincteric margin and extending for varying distances into the posterior urethra, we find hypertrophic folds of velvety mucous membrane, with bulbous vesical knobs, the nodular thickenings resembling cysts very closely. The most common site for this rugous condition of the mucous membrane is at the roof and lateral walls of the sphincteric margin.

A very interesting sequela of the gonorrhœa is the presence of widely dilated crypt orifices, either in the roof or in the floor of the supramontane region. We have not met them in the region of the side walls. Fig. 25 illustrates three such openings, and shows a peculiar cribriform appearance of the largest one, with a flake of pus exuding from it. In the floor, particularly in the neighborhood of the colliculus, these openings may be considerable in size and sometimes represent the perforations of small submucous or prostatic abscesses.

In a paper on urethritis chronica cystica,[1] the subject of cystic formation was discussed in detail. Cysts were found in about twenty cases of my series, but accurate notes were obtained in only fourteen of these. Although all the patients had had either one or more attacks of gonorrhœa, I gained the strong impression that there are two types of cystic disease of the neck of the bladder and posterior urethra. The first and most common of these is undoubtedly an inflammatory process, the end result of a gonorrhœal inflammation, and the second presents itself in the form of simple lesions of retention, such as belong to the involution changes of the senile period. The inflammatory type (namely, those cysts that belong to

[1] *Folia Urologica*, Nov., 1910.

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true urethritis chronica cystica) are most frequently found in the pars supramontana, although they are often seen in the montane portion, and may even involve the colliculus itself. The supramontane region was diseased in all of the cases, whereas the pars montana only in six instances. The verumontanum was found markedly diseased in two of the patients. The cysts vary considerably in size, the smallest measuring about a millimeter in diameter, the larger one, three, four, and five millimeters or more. At times we meet with a confluent form that may take on considerable dimensions. The simple discrete variety is the most common (Fig. 26), tiny hemispheres or ovoid bodies occurring frequently near the sphincter margin. In order to appreciate their color properly it is important to regulate the amount of light so that the illumination is sufficient. When the light is adequate, their surface seems to be made up of a fine, pearly, veil-like membrane, over the surface of which very fine arborescent vessels ramify. The mucous membrane upon which they lie, or more properly in which they are imbedded, is usually found to be thickened and velvety, but the fine vessels as a rule become lost as they are traced into the neighboring mucous membrane, in which they undoubtedly arise. When the illumination is insufficient the true milky surface becomes a pale yellow, and the cystic nature of the body is not easily detected. They then appear to be solid bodies or bulbous hypertrophies. In the region of the pars supramontana the larger, more sessile, less prominent oval cysts were more frequently encountered, lying on either side of the colliculus at the junction of the supramontane and montane regions. These are more apt to be solitary, although at times such large oval cysts may be surrounded by smaller satellites. I have often seen single cysts near the sphincteric margin in the roof of the pars supra-

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montana. Fig. 27 shows the typical tendency of the small cysts to aggregate in one locality. Here the mucous membrane showed marked disease, and in the figure the small areas represent depressions in the mucous membrane, giving a cribriform appearance. This is probably produced by scarring consequent upon a previous inflammatory process. It is the roof of the pars supramontana which seems to be the favorite site for the lesions just described. Fig. 28 shows a larger cyst that is being incised by the endoscopic knife. At the junction of the pars supramontana and montane region we encounter the larger, more elongated cysts that seem to have a predilection for the side walls. The small cysts are seen in the fossula prostatica, where tiny bodies are found in depressions between the posterior frenula and may even ride upon the frenula themselves. Although we would gain the impression that the changes thus far described are rather insignificant, experience teaches us that the same type of pathological change may become very extensive and profound in some cases. In eleven out of fifteen patients the cysts were few in number, and the evidences of an old inflammatory process in the mucous membrane was not very striking, although they were definite enough to be diagnosticated. The more severe type of lesion presented itself in three cases, and could be regarded as of sufficient magnitude to warrant the appellative, urethritis chronia cystica. In one case both the roof and the floor of the vesical sphincter, the roof of the pars supramontana, the fossula, the left wall of the junction and the colliculus itself were beset by small cysts. The picture presented here was one of intense cystic degeneration of the larger part of the posterior urethra. A still more striking instance was afforded by a patient in whom the confluent, large type of cysts was encountered. Here

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the roof and sides of the sphincteric margin were converted into a mass of grape-like bodies, some composed of tiny cystic patches, others being lobulated. The latter may be bilocular, trilocular, or somewhat sausage-shaped cysts. All of these have the typical glistening pearly surface, with large arborescent vessels, which can be traced here and there in the surrounding mucous membrane. Fig. 29 shows a collection of cysts at the right side of the sphincteric margin, the mucous membrane being much thickened, especially below where two cysts are seen to lie in a granular or follicular mucous membrane. Fig. 30 shows the opposite side of the sphincter, the upper part of the illustration showing a portion of a lobulated cyst which was found upward and inward almost to the median line. In Fig. 31 we can see the continuation of the cystic bodies on the roof of the sphincter. There is only a small space free above, where the cribriform and granular variety of mucous membrane is found. Although these pictures give one an idea of the condition at the annulus urethralis, or at the beginning of the posterior urethra, in the case under consideration it gives no conception of the extent of the process in the supramontane portion and the region of the colliculus. On the right, cysts could be traced along the side walls down into the *fossula prostatica*, where numerous bead-like hypertrophies of the posterior frenula were seen (Fig. 32). The colliculus presented the remarkable picture shown in Fig. 33. The utricle was plainly evident at the summit. There was a thin strip of red mucous membrane in the center of the colliculus, but on either side this body was converted into a number of cystic masses.

The Montane Region. Inasmuch as our observations were confined to the post-gonorrhœal stage, we but rarely met with instances of acute inflammation

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of the colliculus. Hyperemia of the colliculus was frequently encountered. Those cases of acute and subacute inflammation of the posterior urethra which we had the opportunity of observing showed considerable enlargement of the colliculus, a velvety condition of its mucosa, an absence of all vascular markings, the utricle still visible, but the ejaculatory ducts being buried and unrecognizable in the swollen mucous membrane. As a result of a posterior urethritis, the mucous membrane of the colliculus loses its smoothness, the outline of this body becomes rough, as is shown in Fig. 34, and in many cases we find the development of cockscomb-like vegetations at the summit or over the declive. Fig. 35 shows a turgid colliculus, with inflammatory excrescences, two enlarged prostatic ducts appearing on the left side of the field. After treatment the villous condition of the colliculus may become considerably reduced, but, as a rule, a close scrutiny of the mucous membrane at close range will reveal pale, pointed, finger-like bodies over the declive even after all evidences of inflammation have disappeared.

In cases of chronic prostatitis we have met with evidences of previous involvement of the colliculus. Fig. 36 illustrates an instance in which the summit of this body has been converted into a veritable crater surmounted and bounded by a series of polyp-like excrescences in the form of an irregularly shaped crown. Fine vessels were discernible even on the surface of the individual tufts, but the mucous membrane had lost the smooth appearance characteristic of the normal picture. The polyp-like excrescences, it seems to me, are but the lobulations produced by a cicatrizing process. In this case we were dealing with the result of a prostatitis of long duration.

We wish to emphasize here that in our experience enlargement, hyperemia and inflammation of the

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colliculus are not as frequent as one would suppose from the writings of those who have relied upon direct endoscopic examination. In the cysto-urethroscope we have at our disposal a reliable means of detecting the slightest increase of size and the most minute changes in the colliculus. The turgescence of this body during erection could be frequently seen, and its varying size under different conditions was made the subject of thorough study. Although it may be urged against this method of urethroscopy, that the pressure of the irrigating fluid may cause a considerable reduction in the size of the colliculus, experience shows that with the proper manipulation of the flow we have within our control an effectual means for overcoming this objection.

In order to control the apparent size of the colliculus under the conditions that obtain in "irrigation urethroscopy" by a direct view in the air medium, we frequently removed the telescope, aspirated the fluid in the sheath and examined the colliculus with the aid of an endoscopic lamp. Fig. 37 shows the picture that is thus obtained. Sometimes the utricle can be recognized, especially if a magnifying lens is used.

Varying degrees of cystic disease of the colliculus were also encountered. An extensive degree of cystic degeneration of the colliculus is shown in Fig. 33, where the summit and a small strip of mucous membrane in the center are alone unaffected by the degenerative process.

Argyria occurs in cases of chronic urethritis that have received a great deal of treatment with silver nitrate. It was usually found affecting the summit and declive of the colliculus, more rarely the acclive. In a number of instances the fossula prostatica was also markedly pigmented. The declive is apt to be rough and stippled, covered by minute black dots;

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or the whole of the declive may have a blue-black appearance. It is not difficult to differentiate this condition from prostatic sand. The granules of prostatic sand are much larger, are not confined to any particular portion of the colliculus, are very often encysted, and are more frequently seen in the region of the acclive and sulci laterales. In the pars supramontana larger collections of gravel-like material are often deposited between the frenula.

It would take us too far to go into a detailed description of the anomalous conditions that were encountered. As a result of repeated instrumentation, traumatism or chronic urethritis, considerable distortion of the colliculus may be produced. Thus we have found these bodies to be converted into a number of knob-like masses; peculiar bands have been seen to divide the colliculus into irregular portions, and an atrophic condition with considerable reduction in the size of the colliculus was encountered. These are some of the peculiar types of disfigurement amongst the many in our series.

Fig. 38 shows the left sulcus lateralis and a small portion of the colliculus in a most interesting case. The patient consulted me because of atrophy of the left testicle. He had received an injury about eight years previously, having fallen astride on the perineum. As a result of this trauma the urethra was ruptured and two operations for the restoration of the canal had been since performed. At the time of examination the urethra admitted a No. 27 Charrière sound and showed a most interesting lesion in the prostatic urethra. The colliculus was scarred and much enlarged, showing a number of bulbous bodies represented in the figure. In the left sulcus lateralis there was an oval depressed cicatrix, at the bottom of which there were smaller scars and deep pits. There seems to be little doubt but that this

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lesion represents a connective tissue change in the prostatic urethra and in the prostate, possibly involving the ejaculatory duct on that side and in all probability the cause of the atrophic condition of the left testicle.

As the result of repeated infections with gonorrhœa and (as I have interpreted the pictures) following the evacuation of purulent collections in the prostate, certain prostatic ducts on either side of the colliculus may become permanently enlarged. Their orifices are oval and usually lie in depressions that are probably the seat of scar tissue. Fig. 39 shows the right sulcus and the colliculus in such a case. The colliculus is somewhat distorted, is elongated and carries enlarged vessels. The sulcus is pale where it lodges a fossa whose wall is lined by pearly ridged mucosa. At the bottom of this oval depression a duct-opening is the most striking feature of the picture.

Papillomata of the prostatic urethra are not uncommon. A favorite site is a point near the summit of the colliculus, to the right or left of the utricle orifice. Usually there is a long slender pedicle bearing a swollen bulb-like extremity, as depicted in Fig. 40. This particular case was treated by the fulguration method through the cysto-urethroscope, a No. 5 Charrière fulguration wire being employed. Sometimes the bulbous end is absent and a number of delicate villi radiate from a slender stalk in scepter-like fashion. An interesting finding is illustrated in Fig. 41, where there was a small villous tumor arising from the foot of the acclive.

We must be careful to recognize the minute, conical, cockscomb excrescences that beset the declive, and less frequently the acclive of the verumontanum, in the healed stage of a severe posterior urethritis and prostatitis. These are not true papillomata. The differential diagnosis may be difficult when the outgrowth

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is small and when it simulates the broken pedicle of a true papilloma. I had the good fortune to verify the urethroscopic diagnosis of papilloma in one case, by microscopic examination of the tumor after it had been removed through a straight tube by means of a forceps.

Less striking lesions, such as follicular hypertrophy, scars, granulations were seen now and then. My material is not large enough to describe these in full, and I shall therefore refer to them in a future publication. My conception of the lesions in the membranous and bulbous urethra, as seen with the cysto-urethroscope, is also not complete enough as yet to warrant a description of them here. A thorough study of this region is now in progress.

At the time of the present writing I have had occasion to examine but a very few cases of stricture of the urethra.[1] I cannot refrain, however, from citing one instance, because it permitted of such satisfactory inspection of the site of the lesion. In the bulb not far from the bulbo-pendulous junction (Fig. 42) there was a crescentic, shelf-like band of tissue of a pale gray-white to yellow-red color projecting above the surrounding mucous membrane and occupying the floor and side walls.

In prostatic hypertrophy the cysto-urethroscope offers us an excellent means of diagnosis, as well as of estimating the exact extent of the intravesical and endo-urethral enlargement. In the series of illustrations 43 to 46 inclusive, we have pictures which demonstrate clearly the changes produced by hypertrophy of the prostate. Fig. 43 shows the prominence of the lateral lobes at the floor of the sphincteric margin. Comparing this figure with the illustration of the normal sphincteric floor, we note a

[1] Since writing the above a number of additional cases have been examined some of which have been treated by fulguration through the cysto-urethroscope

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total absence of the transverse line, and the presence of two rounded bodies separated by a V-shaped incisure. The tortuous blood vessels are plainly visible. A lateral view of the sphincter is seen in Fig. 44, where the typical concave margin is absent, and the left lateral lobe overlaps the sphincter. With the fenestra of the instrument still looking downward and including a portion corresponding to the supramontane urethra, a picture illustrated by Fig. 45 presents itself. The prostatic lobes look like two large vocal cords separated by a deep cleft. Evidently the shaft of the instrument rides upon the prostatic lobes, whose rigidity prevents contact with the region of the fossula, and effectually masks this part of urethra. By increasing the force of the irrigating flow we can make the two lobes separate, the telescope looking down into a deep cavity, the bottom of which remains dark. The montane urethra and the distal portion of the montane region of the same case is shown in Fig. 46. The peripheral termination of the lateral lobes is seen to lie somewhere near the junction of the montane and membranous urethra and the small size of the colliculus becomes evident. This is a feature which is frequently encountered in hypertrophy of the prostate and of some diagnostic value.

There are cases of prostatic hypertrophy in which there is little or no distortion of the sphincteric margin. In these there may be very marked endo-urethral changes. Beginning our observation with the floor of the sphincteric margin in such instances and drawing the instrument outward, we soon meet with projections of the lateral lobes which form a V-shaped cleft in the supramontane region. Distally, these become more prominent and form two ridges, such as are seen in Fig. 45. These prostatic lobes have a tendency to overshadow the distal part of the supramontane region and the fossula prostatica. They

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separate as we approach the region of the colliculus, but even this body may be shadowed, as it were, and elude the unpracticed eye. I have frequently resorted to the following maneuver in demonstrating the colliculus to students in such cases of prostatic hypertrophy. The ocular of the instrument is raised somewhat with the right hand, and the shaft of the instrument is pressed downward towards the perineum with the left. In this way the shaft descends between the rigid lobe upon which it has a tendency to ride, and the fenestra approaches the fossula prostatica and colliculus. What would otherwise appear as a deep chasm, the bottom of which is imperfectly illuminated, now becomes bright and distinct.

We have already elsewhere referred to the fact that after the age of forty-five we may meet with small cysts of the prostatic urethra, sometimes enclosing prostatic sand as an evidence of senile change. Although such cysts usually occur in the fossula prostatica, they are not strictly limited to this region. And so we also find them on hypertrophied prostatic lobules. In those cases of prostatic hypertrophy where we have to deal with an added chronic cystitis, we may meet with an interesting lesion. The cystic bodies become enlarged by virtue of edema, and we see a collection of such cysts on one or both prostatic lobes, some becoming pedunculated, forming small pyriform masses with milky contents.

In a case of perineal prostatectomy, followed by the establishment of a perineal fistula, that came under my observation, the cavity left by a somewhat incomplete removal could be completely mapped out, and the opening of the fistula in the prostatic urethra could be detected after the injection of methylene blue. Figs. 47 to 50 inclusive show the irregular, somewhat ragged oblong cavern as it could be traced

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from the supramontane urethra towards the membranous. The central and distal terminations of the cavity are shown in Figs. 47 and 50 respectively. The region seen in Fig. 49 contained the orifice of the fistula, which is not indicated in the drawing, inasmuch as it could be seen only upon considerable dilatation, being hidden by the ragged left residual lobe of the prostate. Two small lobulated masses, somewhat pyriform in shape, also occupy this region. For a study of the endo-urethral and sphincteric aspect of the hypertrophied prostate, in those cases where but slight enlargement can be felt per rectum and particularly in the early cases, the cysto-urethroscope gives most reliable information.

Conclusions. First, the author's cysto-urethroscope possesses distinct advantages in the ease of manipulation and in the accuracy of the pictures obtained. In a study of over five hundred cases the value of the instrument in diagnosis and treatment was demonstrated. Second, the ureteral orifices, trigone, the sphincteric margin, posterior urethra and bulb can be thoroughly studied, and it is not likely that even the minutest detail will escape the eye of a careful observer. Third, in the author's paper, the usual normal pictures are described in detail, and some of the more striking pathological findings are reported. Fourth, the Goldschmidt method of constant irrigation of the posterior urethra is also of great value when employed with the author's instrument.

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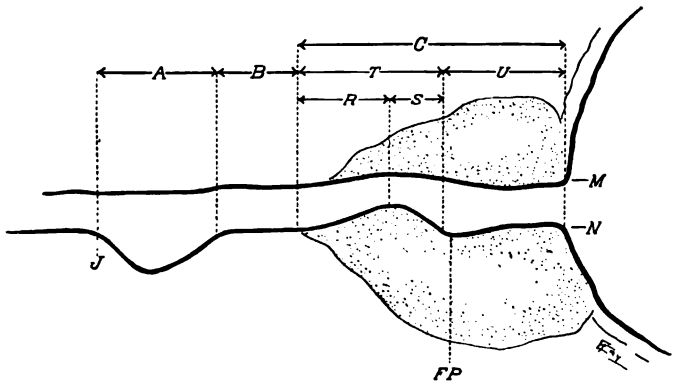

Fig. 1

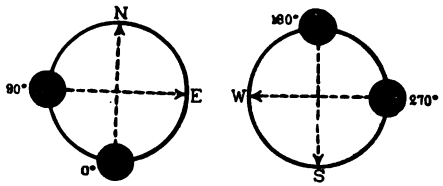

Fig. 2

Fig. 3

EXPLANATIONS OF FIGURES[1]

Fig. 1. Schematic drawing showing author's method of dividing up the posterior urethra and bulb. The exact proportions are not adhered to, the bulb being relatively too small in the figure.

Fig. 2. Schematic representation of the far point of the field; when the fenestra of the cysto-urethroscope is at the black circle, the arrowpoint indicates the most distant part of the field.

Fig. 3. Sheath of author's cysto-urethroscope with obturator in place: *a*, beak; *b*, fenestra with notch; *c*, coupling for current; *d*, faucets; *e*, locking screw; *f*, obtruator.

[1] All the half-tone drawings are exact reproductions of pictures seen through the cysto-urethroscope. The drawings were made while the artist was looking through the instrument.

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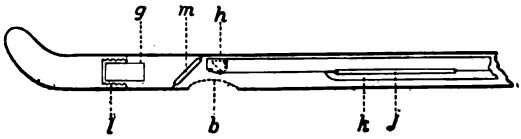

Fig. 4

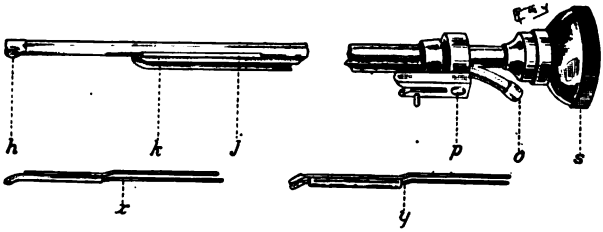

Fig 5

Fig. 6

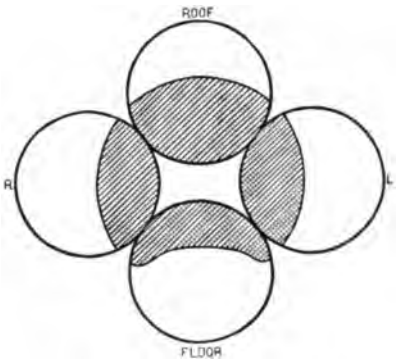

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 4. Cysto-urethroscope with disposition of light and lens system diagrammatically shown; *b*, fenestra; *g*, lamp socket; *l*, screw joint of beak; *h*, objective, with cap; *j*, telescopic joint for deflectors; *k*, catheter channel; *m*, illuminating window.

Fig. 5. Telescope of the cysto-urethroscope: *h*, objective; *j*, telescopie joint; *k*, catheter groove; *o*, catheter outlet; *p*, locking fork; *s*, ocular; *x*, filiform deflector; *y*, catheter deflector.

Fig. 6. Floor of the urethral aspect of the internal sphincter.

Fig. 7. Diagrammatic representation of the internal sphincter.

Fig. 8. Trigone and overhanging roof of the empty bladder.

Fig. 9. Divided overhanging vesical roof of the empty bladder.

Fig. 10. Roof of the empty bladder falling down on the sphincter as viewed with the fenestra pointing down and to the right.

Fig. 11. Sharp notch at roof of internal sphincter.

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Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

Fig. 19

Fig. 12. Floor of the proximal portion of the supramontane region when this forms a valley surmounted by prominent side walls.

Fig. 13. Normal colliculus with prominent posterior frenula.

Fig. 14. Normal colliculus viewed from in front (distally), presenting summit and acclive.

Fig. 15. Normal colliculus with utricle and ejaculatory ducts.

Fig. 16. Normal colliculus with declive (above), and striking orbicular orifices.

Fig. 17. Pyramidal shaped colliculus with umbilicated utricle.

Fig. 18. Atypical colliculus with peculiar utricle.

Fig. 19. Junction of pendulous and bulbous urethra. The dark area is the non-illuminated bulb; the bright white portion below is the beginning of the floor of the pendulous urethra. If more illumination be employed the bulb would be clearly visible.

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Fig. 20

Fig. 21

Fig. 22

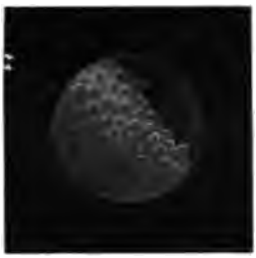

Fig. 23

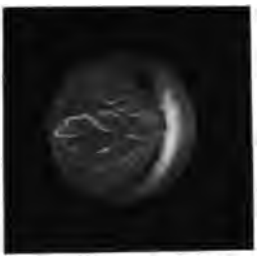

Fig. 24

Fig. 25

Fig. 26

Fig. 27

Fig. 20. Juxta-sphincteric portion of the trigone where the mucous membrane shows the continuation of the trigonal markings. Owing to the declination posteriorly, the upper part of the field becomes dark. Figure shows a very vascular mucous membrane.

Fig. 21. Norma. sphincter; right margin.

Fig. 22. Left margin and part of the roof of the sphincter with reduplicated marginal fold.

Fig. 23. Juxta-sphincteric region to right of median line, at the floor of the bladder in one type of cystitis colli.

Fig. 24. Papilloma at the left margin of the internal sphincter.

Fig. 25. Large (pathological) crypts in roof of pars supramontana with purulent contents.

Fig. 26. Solitary cyst at the roof of the internal sphincter.

Fig. 27. Small cysts in roof of the pars supramontana.

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Fig. 28

Fig. 29

Fig. 30

Fig. 31

Fig. 32

Fig. 33

Fig. 34

Fig. 35

Fig. 28. Cyst on left side wall of prostatic urethra; knife is piercing the cyst; drawn with knife *in situ*.

Fig. 29. Collection of cysts in the right margin of the internal sphincter.

Fig. 30. Conglomerate cysts in the left margin of the sphincter.

Fig. 31. Symmetrical cystic bodies at margin of roof of the sphincter. The cysts encroached upon the internal urethral orifice, obstructing it.

Fig. 32. Fossula prostatica and declive of same case as shown in Figs. 29–31. Above, in the figure, is seen the bulbous degeneration of the frenula; on the left, the deep cleft is an enlarged prostatic duct.

Fig. 33. Cystic degeneration of the colliculus.

Fig. 34. Turgid colliculus with irregular contour, in subacute urethritis.

Fig. 35. Inflammatory excresences on the colliculus.

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Fig. 36

Fig. 37

Fig. 38

Fig. 39

Fig. 40

Fig. 41

Fig. 42

Fig. 43

Fig. 36. Crater-like distortion of the summit of the colliculus, the result of chronic inflammation.

Fig. 37. Colliculus as seen without the telescope, with an endoscopic light carrier.

Fig. 38. Left sulcus lateralis contains an oval scar. On the left, in the figure, is seen the bulbous left margin of the enlarged, distorted colliculus: case of atrophy of left testicle.

Fig. 39. Enlarged prostatic duct in depressed scar tissue in the right sulcus lateralis; displaced and distorted colliculus.

Fig. 40. Papilloma arising from the summit of the colliculus; common variety at the usual site.

Fig. 41. Small papilloma lying against colliculus and arising by a slender pedicle from the foot of that body.

Fig. 42. Stricture of the bulbous urethra, showing a tear after dilatation to Charriére 24.

Fig. 43. Floor of the sphincter in hypertrophy of the prostate showing enlarged lateral lobes.

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Fig. 44

Fig. 45

Fig. 46

Fig. 47

Fig. 48

Fig. 49

Fig. 50

Fig. 44. Left side of the sphincter in prostatic hypertrophy.

Fig. 45. Floor of pars supramontana in prostatic hypertrophy.

Fig. 46. Montane region in prostatic hypertrophy; note prostatic lobes and small colliculus.

Fig. 47–50. Series showing excavation left after perineal prostatectomy. Consecutive fields taking in the floor of the prostatic urethra are represented, beginning with number 47 as the field nearest the bladder.

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DISEASE AND TREATMENT OF THE VERUMONTANUM.

GEORGE KNOWLES SWINBURNE
NEW YORK CITY.

Your president has asked me to write further on disease of the verumontanum and its treatment. It occurs to me first to speak of a class of cases apparently not generally recognized, for many of these cases are treated by men, who apparently do not use the microscope, as cases of plain gonorrhœa. They may be treated a long time and then get into the hands of others, and their history becomes of months' or even years' standing. They then become recognized as cases of gleet and go through the torturing treatment with sounds. *Pari passu*, I should say that this should not be torturing, but many of the gentlemen who so readily resort to sounds do not use them in the skilful way that they should be used, as doubtless you can all cite numerous examples.

One case will illustrate: A young man about thirty was referred to me by Dr. Brewer, a year and a half ago, to whom he had applied in his extremity. He was suffering from sharp attacks of pain in the urethral canal, which would come and go independently of times of urination. He was profoundly neurasthenic. He also had pain over the sacrum. He had been treated for a long time by his physician for a supposed gonorrhœa, yet when he came to me he declared that the discharge which he had, very slight and mucoid, had never been any different during the entire time, and he had been treated for a

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long time — a year and a half. And then these pains had suddenly come on, which were breaking down his not over robust health. I made the usual routine examination of the urethral discharge (very slight), the prostate and vesicles, and then examined the posterior urethra, and found what I had from the first suspected — a bleeding, congested verumontanum, and a very exquisitely sensitive urethra. The first treatment of swabbing the posterior urethra with twenty per cent silver nitrate was a severe ordeal for him, yet following the treatment he felt better. I made the applications as usual a week apart, with steady improvement in his case until final cure.

This class of cases I have come to look upon as due in great measure, if not entirely, to imperfect metabolism, intestinal fermentation, oxaluria, indicanuria, or what you will; at any rate, I find it necessary to improve as far as possible the digestive system of these cases. Sometimes my own slight knowledge of intestinal therapeutics suffices, and at other times I find it necessary to refer them.

P. O., broker, thirty-five years of age, was referred to me, having a slight muco-purulent discharge, sometimes present, sometimes not. To his knowledge he had never had gonorrhœa. Had in some hands been treated with sounds, always extremely painful, never giving relief, often followed by bleeding from the urethral canal. He was rather anæmic, and suffered much from constipation. Physicians who had treated him took it for granted that it was a case of gleet. It was a typical verumontanum case, and went on steadily to complete cure under treatment, but his constipation continued and he had at times abdominal pain in the right iliac fossa. I referred him to Dr. Barclay for examination as to his intestinal condition, who referred him back

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to me with the diagnosis of chronic appendicitis and advised operation. The gentleman wished to go back to his own home for operation instead of remaining in New York, which he did, and on my explaining to him my view of his urethral condition, asked me if I would write to his family physician at home, because of an intimation that this practitioner had never believed in his declaration that he had never had a gonorrhœa. This I was glad to do, and received a letter from the physician in question, who stated that there was no question about his intestinal condition. He was operated on for appendicitis and a chronically inflamed appendix removed. I saw him several months after, when he had completely recovered and gained several pounds in weight. His face had a much better color and expression. I believe that had this case not had his intestinal condition improved his urethral condition would have relapsed.

I also find this state of affairs in men who have had a previous gonorrhœa, and usually this condition is supposed to be due to that, but my own belief is that gonorrhœa is not the primary cause, though it may render the condition worse.

A case referred to me two or three years ago by Dr. Kennedy. He had had gonorrhœa fifteen years before, and following that he had always had a muco-purulent discharge. He had consulted many physicians and surgeons both in this country and Europe (he came from Russia). He had had this condition for fifteen years. He had married, had a large family (six or eight children), but he had always been troubled with burning on urination and troubled by the fact of this discharge. He consulted many eminent men both in Europe and here, some of very high reputation. One in particular told him that he needed an external urethrotomy for tight stricture

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which he had in the deep urethra. This was advised two or three years before Dr. Kennedy brought him to me to see what I thought of him. I found this same condition of the posterior urethra — no other symptoms. After treatment for three months the trouble entirely disappeared. I could multiply these cases, but the repetition of a large number of cases after a time becomes monotonous.

The symptoms of this trouble are varied, as I have already mentioned in a previous paper. The point I wish to bring forward is the great probability of this condition even in cases of chronic gonorrhœa existing independently of the gonorrhœa, though probably being made worse by it. It is one of the causes, in my opinion, of so many cases of chronic gonorrhœa, but there are many other causes. This is simply one of them.

Another of the many symptoms is the occurrence of frequent nocturnal emissions. One case I had very recently, a man twenty-eight years of age, who had suffered in this manner for a number of years. He had no venereal disease. He had come to look upon his condition as incurable, and was brought to me by a friend of his. It is a curious fact that though I have only had him under treatment now for about four weeks, he has stated that he has not had a nocturnal emission since the first application, though before that they had occurred every other night. This is not always the happy result in many of these cases that I have treated, as sometimes the treatment does not influence the frequency so soon.

I remember when I was a medical student my preceptor, in a lesson on stone in the bladder, stated that in young children stone in the bladder caused boys to manipulate the penis until it brought on the habit of masturbation. Now I am also convinced that this condition of the verumontanum in young

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men will cause an impulse toward masturbation. I fancy it is true that frequent masturbation, also sexual excitement without gratification, causes congestion of the posterior urethra. If it does, then in this way a vicious circle is formed.

The history of a case related to me by Dr. Gardner set me to thinking of a case I had some time before I had examined many cases of congested posterior urethra, — a widower, of moral character, who shortly after his wife's death had an almost uncontrollable impulse for sexual gratification, which seemed to be entirely beyond his control. On being consulted, Dr. Gardner examined his urethra and found a congested verumontanum, and by applications of nitrate of silver brought about a complete cessation of this marked impulse. This reminded me of the case of a gentleman who was separated for a period of time from his wife, who consulted me for frequent emissions. But it happened at a time when I was not so familiar with the symptoms occurring in this condition, and I merely gave him advice instead of treatment. Today I should do more than simply offer advice. I made no attempt to discover his condition. This condition was evidently a pathological one, and it was only brought into notice by his cessation from regular sexual intercourse.

This brings up another side of the question, and that is, that I have met with this trouble, "disease of the verumontanum," in married men, and the symptoms exhibited by them were various. For instance, some complain of premature ejaculation. Others who have suffered from this condition for a period of years find their sexual power is not what it was, and feel the time is coming when they will not be able to have an erection. Sometimes there is complete impotencey. These cases are quite common.

I reported a case in my paper on the "Complement

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Fixation Test in Gonorrhœa," which harks back to the mucoid discharge. Many of these patients will notice and emphasize this point, which leads the physician to declare the discharge to be caused by gonorrhœa. The condition may have existed for some time without being noticed, but being exposed to the possibility of gonorrhœal disease they give themselves over to much self-examination and find this mucoid discharge. One of the frequent symptoms is a burning on urination following sexual intercourse. They hie themselves off for medical advice and are at once told that they have a gonorrhœa. This case, of a married man who had been under treatment for some two months before he came to me, made the statement that his condition was unchanged from that when he sought aid to the time that he came to me. He had after an exposure some burning on urination. He found that he had a mucoid discharge. He was treated for two months for gonorrhœa. I found that he had disease of the verumontanum, and this was treated. I had his blood examined for gonorrhœa and the complement-fixation test proved negative.

As to treatment of this condition, I have tried various applications to the posterior urethra. The electro-cautery, tincture of iodine, monochlor. acetic acid, silver nitrate in varying solutions from five per cent up to twenty per cent, and the solid stick; the fused nitrate of silver at the end of a silver probe. I rather prefer, though others do not, the twenty per cent solution. This seldom gives much discomfort when the applications are not made posteriorly to the verumontanum itself. If they are, and sometimes one finds a congested condition of the urethra behind this point, it is apt to give rise to very uncomfortable sensations, and oftentimes to urgent urination, so that accidents may happen; but if the appli-

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cation is confined to the verumontanum and the portion of the urethra anterior to it which is affected, nothing more than an uncomfortable sensation for about fifteen minutes is felt, and after a few applications the patients suffer no undue discomfort. I have described my manner of treatment in another paper. Swabbing with a cotton swab through the urethroscope with a twenty per cent solution and then drying it with a wad of cotton on a stick. When I apply the silver nitrate I leave the solution on for several seconds, sometimes as long as twenty seconds, then swab it dry and withdraw the instrument to portion in front of this, making the application very thorough, drawing the instrument forward and making the application as each part comes into view. These applications I have never made oftener than once in five days. I prefer to make them at first once a week, and then when the bleeding is less, in fact when there is no bleeding of the surface of the urethra, I make the applications once in two weeks, then once in three weeks, and once a month, and when a case can go for once a month, as a general thing the part is so healed that there is little danger of relapse. Some few cases I have treated a second time for a short time because I found I had let them go too soon, but in all these cases, looking upon them, the majority of them, as cases of intestinal fermentation, as I have stated before, I always give some attention to the digestive apparatus.

Now, although in the great majority of instances the results are all that can be looked for, and the worst symptom, the neurasthenia, is completely recovered from, yet there have been many cases not so fortunate; while the urethra may be completely healed, yet the neurasthenia has persisted.

An important point is that the urethroscope is not indicated while gonococci are present, and prostatitis

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and seminal vesiculitis, if present, should first be treated until relieved or until no further improvement can be made.

I now prefer to have my instruments made of pure silver. The Electro-Surgical Instrument Co., of Rochester, make for me a special size, 22 F., which seems to be more comfortable for the patient, and I am not now so often obliged to do a meatotomy as formerly. The silver instrument withstands better the corrosive effect of the silver solutions.

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TREATMENT OF DISEASES OF THE POSTERIOR URETHRA.

JOHN A. HAWKINS,
PITTSBURGH, PA.

The suggestions set forth in this brief paper are the results of my personal experience and may differ from text-books, which in many instances appear to me as mere repetitions of previous works.

The day of treatment of diseases of the posterior urethra by sounds and instillation alone is long past, and with the etiology and pathology fairly understood, the use of more rational methods should give more satisfactory results. I confess that with the results of treatment of the deep urethral lesions I am not entirely satisfied. It is possible that too much is expected, but there are so many patients presenting groups of symptoms leading to suspicions of conditions which are found not to exist when examined by modern methods, that the work really is disappointing. I hear doctors of limited experience frequently tell how easy it is to get rid of pus threads in the urine. To me that condition is a nightmare, for, after long, careful, and conscientious treatment, I frequently must confess, to myself at least, that permanent distortion of the affected parts prevents a return to a perfectly normal condition. And is it not possible, especially in long-standing cases of gonorrhal urethritis, that pathologic changes occur that never become normal? I believe so.

In previous papers before this honorable body and others, I have always advocated the use of the

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urethroscope, with the light thrown down the tube from the proximal end, and for years have used the Fenwick instrument made by Schall, of London. The past year I have used a light carrier — a modification of the little instrument shown by Dr. Bentley Squier at the St. Louis meeting. The modification consists simply in having the lamp carrier movable on the bar in order that it may be moved closer or farther from the object, as on its top are located two lenses, a plus and a minus, for enlarging the image with the different length tubes. These tubes to which the light carrier is attached are the regular Leiter tubes, varying in size from 18 F. to 32 F., the curved-beaked, deep urethral tubes ranging from 24 F. to 30 F. The 24 F. deep urethral tube measures from shoulder to fenestrum six and one half inches, and with it a very clear image of the urethral floor is secured.

In addition, the oblique view cystoscope made by Wappler has proved of great value for examinations, and I think is the only cystoscope of much value in the deep urethra except that of Buerger and of Pilcher. With this instrument examination of the deep urethra and of the bladder, and ureteral catheterization, can be completed without removal of the cystoscope, and best of all, the image is not transposed. As with the Buerger instrument, water is allowed to flow into the deep urethra through the cystoscope from an irrigator so as to push the mucosa away from the fenestrum.

Stricture of the deep urethra was believed until recently never to exist, and in this city (Chicago) in March, 1910, when I reported a case, several gentlemen received the report in an unflattering manner. Fortunately for me, in the discussion, Dr. Kolischer spoke fully of the existence of the lesion.

Stricture of the deep urethra occurs in the circular

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fibers at the vesico-urethral junction and, I think, is always an inflammatory sequence. In the case I presented, the internal urethral orifice was so small that the removal of the tube inserted after a perineal prostatectomy was followed by retention, and the patient was only permanently relieved by cutting the contracted ring through a suprapubic opening and then forcibly dilating it. This was in 1909, and since then the patient has never been troubled with retention or dribbling, but the irritation is always present to a greater or less degree. Six years before seeing him first, he had passed a good-sized stone, the appearance of which explained his previous sufferings.

In a number of patients operated for prostatic obstruction, stricture, or fistulæ, the same condition has been found, and all have been treated likewise.

Severe inflammatory symptoms of tenesmus, drop of blood, etc., following or accompanying an acute gonorrhœa are quickest relieved by a few drops of silver nitrate of fifteen per cent strength, deposited in the deep urethra with an Ultzman syringe after local anesthesia.

Irrigation with a 1:2000 solution of quinine and urea hydrochlorid causes less distress and gives as good results as any other irrigation. In this connection I might add that quinine and urea hydrochlorid, 15 gr. to the liter, after any severe treatment of the deep urethra, completely abates all pain for a number of hours, and as it does no harm I would suggest its almost routine employment.

I confess that my results with potassium permanganate have been neither pleasant nor satisfactory, and I consider weak solutions of nitric acid equally as efficient and much cleaner (5 to 8 drops of C. P. nitric acid to the liter).

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Papillomata of the deep urethra need not be snared off or burned off with the galvanocautery. They may be scraped away with the edge of the urethral tube. This little operation I first saw at Mr. Fenwick's clinic in London, in 1899, and I called attention to it in the *Journal of Cutaneous and Genito-Urinary Diseases*, in November, 1901. It has served me well on several occasions, and many times for removal of polyps of the anterior urethra.

Fulguration[1] is also a successful method of removal of these growths, and with the posterior urethra distended, it is not a difficult task, using the fulguration electrode through the Wappler oblique vision cystoscope exactly as you would catheterize a ureter or probe areas in the deep urethra.

Ulcers in the deep urethra are best treated by strong solutions of silver nitrate on swabs, through the deep urethral tube. If desirable, fulguration may be used, through the "oblique vision" cystoscope in the same manner as in urethral catheterization.

Chronic gonorrhœal posterior urethritis seems less obstinate in recent years. Use of the cold sounds is not routine. You all, no doubt, recall Ultzman's line of treatment, where cold sounds, followed either by irrigation or instillation, were used every second or third day. I endeavor to treat these patients at long intervals — one week, if possible, endeavoring never to overtreat them. The full-sized sound, followed by quinine bisulphate solution by irrigation, or silver nitrate instillation, is followed at the next sitting by topical application through the urethroscope. The next time a copper electrode is

[1] Since writing this paper I have successfully used fulguration in the removal of a number of papillomas in the neighborhood of the verumontanum, using the cysto-urethroscope, water dilatation, and the Wappler insulated wire electrode. The current used for this purpose must be the very high frequency, and is not obtained from the small, portable outfits. From the latter the current is painful.

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passed, the positive pole attached to it, and the galvanic current applied and increased until the patient just feels it. He usually complains of burning of the skin over the abdomen, which necessitates the frequent sliding of the negative sponge placed there before burning is felt in the urethra. The amount of current varies from .5 to 3 m.a. and the duration, three to five minutes. I propose trying the high-frequency current as soon as I can get a suitable electrode.

No anesthetic should be applied when the galvanic current is used, although with the positive pole destruction of tissue is hardly possible.

I have also used a hollow rubber electrode, with perforations in the sides of the part, placed in the deep urethra. Through this fluid extract of hydrastis is instilled, a copper wire inserted to the bottom of the rubber canula, and the positive pole attached. Cataphoresis is secured with beneficial results in some cases.

Although, as in other methods of treatment, good results are not always secured, I must say that I have never seen any disagreeable symptoms follow cataphoresis, and I have great hopes for it when it is better understood.

The treatment of inflammation of the various parts of the verumontanum resolves itself into topical applications through the endoscope and cystourethroscope, cataphoresis and internal medication. Silver nitrate, fifteen per cent, on a saturated swab has given better results than any other application. This strength appears to be much less painful than weaker solutions. Once a week is often enough; in fact never give a subsequent treatment until all irrigation has disappeared, and between applications it is advisable to irrigate the entire urethra and bladder with a solution of nitric acid, 4 to 8 drops to the liter (1 to 4,000 to 1 to 2,000), or quinine bisulph.

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10 gr. to the liter (1 to 1,500). This usually reduces the succulent caput, one or two treatments frequently showing improvement. I favor this treatment rather than more radical measures, because no scar tissue remains. After cutting or burning this always results, and may be followed by retention cysts or even stenosis of the puncta ejaculares. Fulguration in this particular locality is open to the same objection, and I think it is a part of wisdom to deal cautiously with these very important structures.

Many patients suffering from lesions of the deep urethra are badly in need of tonic treatment, many being markedly neurotic, constipated, morose, and with poor appetites. The less balsams the better. Although contraindicated in inflammatory conditions, I believe these patients are all benefited by strychnine, in not less than $\frac{1}{20}$ grain doses four times daily. Quinine also is useful in two-grain doses. Cold or tepid baths, massage, auto-condensation, etc., are all useful adjuncts and should not be forgotten.

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DISCUSSION

OF PAPERS OF DRS. BUERGER, SWINBURNE AND HAWKINS.

DR. H. J. SCHERCK of St. Louis: I should like to ask Dr. Buerger whether or not he has made any studies of the posterior urethra in regard to the condition of the ejaculatory ducts after either suprapubic or perineal prostatectomy.

DR. R. L. RIGDON of San Francisco: I saw the description of the Buerger urethroscope in a medical journal when it was first put on the market and obtained one immediately. With this I for the first time obtained a satisfactory view of the posterior urethra. Since then I have had considerable experience in examining the urethra, both with the Buerger and with the oblique instrument, but do not feel at the present time that I have had sufficient experience to interpret positively all of the pictures that I have seen. For instance, in a number of cases it has been my fortune to observe an opening in the posterior urethra, usually in one of the sinuses at the side of the verumontanum, that would rhythmically extrude fluid — pus, perhaps,— resembling very closely the escape of urine from the ureter. I have noticed this in a number of cases, and I would like to ask Dr. Buerger what this means. I also would ask the doctor if in the normal urethra the opening of the ducts of the prostate can be seen; are they prominent on the floor, roof and lateral walls? Also, if when we see those larger openings, such as he pictured to us here, is that always an indication of a then existing or previously existing inflammation of the prostate?

I have noticed that V-shaped appearance of the superior margin of the sphincter very often. I have also found that it would disappear if the bladder were more fully distended. It is nearly always present if the bladder is only partially inflated, but if the water is allowed to run this V-shaped appearance disappears.

Another thing that has been of interest to me was to see in normal cases how very definitely the floor of the bladder comes to the urethra, that is, the trigone runs directly into the urethra without any marked sphincter or ridge. On the lateral margins you can see the well-defined crescentic sphincter, but no such margin can be seen on the floor.

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DR. ERNEST G. MARK of Kansas City: I wish to congratulate Dr. Buerger upon his pictures. I think his work will call especial attention to one thing, and that is we have got to reconstruct our views of posterior urethroscopy. In other words, we who have been accustomed in the past to use either a straight tube urethroscope or a curved slumbering tube under direct vision, must go to using water. For the observation of the posterior urethra and for the definite diagnosis, the water inflation is so far superior to air or any other method that we must accept it as the final word in posterior urethroscopy. There are a few things that we have got to reconstruct our views on. Dr. Buerger beautifully showed a bag-like formation looking almost like trabeculation. Those at first puzzled me very much. It seemed to be a pathological condition. I think we have got to study the posterior urethra with a lens system, and I think it will be a few years yet before we can determine the pathology as it should be determined.

DR. G. KOLISCHER of Chicago: As I understand Dr. Buerger he said that by the aid of his instrument he is able to see new conditions in the bladder and the urethra that could not be seen and determined through any other instrument. While I have no experience with his instrument, still I must state his demonstration did not appear to me as convincing so far as this his statement is concerned. He claimed in particular that conditions in the bladder, near and around the internal urethral orifice, cannot be distinctly seen through any other instrument, and then went on and described several such conditions. Now every one of these conditions that he quoted were described years ago by cystoscopists, consequently they must have been seen, although these authors were not in a position to use Dr. Buerger's instrument. Personally I don't know of any condition in the bladder, whether it is in the vertex or in the fundus or in the trigonum or in close proximity of the urethral orifice, that could not be distinctly seen and determined with the aid of an ordinary Nitze cystoscope, or, if it comes to the worst, with a retrospective cystoscope, I do not know of any condition in the urethra that could not be seen by the Goldschmidt urethroscope, and Dr. Buerger's demonstration has not changed this conviction.

As to the pathology that the doctor expounded in his paper I would like to get some information out of him. He showed one picture which to my mind represents a typical case of edema bullosum. Yet the doctor says that it cannot be edema because this condition was a chronic one. I never knew that these

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two conditions were excluding each other. I would like to ask the doctor what he means by true inflammation that leads to hyperplasia. The doctor told us that he was quite sure that the papilloma demonstrated by him was due to an inflammation. I think that the causative connection between inflammation and a neoplasm is so interesting that he should tell us all about it.

DR. GRANVILLE MACGOWAN of Los Angeles: I have been greatly interested in this paper of Dr. Buerger's. Five years ago when I was in Berlin my friend Goldschmidt introduced me to his urethroscope. About the same time my friend Luys in Paris demonstrated his urethro-cystoscope to me. I brought both of them home, had an abundance of material to use them on, and my Goldschmidt instrument, I am sorry to say, is in what I call my boneyard. I have never been able to get satisfactory views of the posterior urethra with the Goldschmidt urethroscope. I think that is due to the fact that I am obliged to call in the optician to help me see — in other words, I wear bi-focal glasses.

About the same time I determined that in a large number of cases the disease was not in the prostate, but of the posterior urethra. Those people would not get well. With Swinburne's posterior urethroscope I did not get a view of the roof of the urethra. I learned from my very considerable number of operations on the prostate gland that the roof of the urethra was the seat oftentimes of disease, and the sides very commonly. In spite of the very magisterial warnings from our friend Taylor, who is now dead, that it is a wrong thing to use a straight urethroscope — I determined to see all portions of the urethra well with a straight tube, so I learned how to use such a tube without danger in the posterior urethra. After learning it, I taught it to my assistants. I am quite certain that almost all these things that the doctor has shown us here today can be seen perfectly well with a straight E. S. I. Rochester tube, assisted by an apparatus which we use to keep the field of vision continuously dry. In the Luys cysto-urethroscope there is a straight auxiliary tube which he attaches onto a large rubber tube connected with an exhaust pump upon the water faucet of a washbowl or sink. I devised a straight tube which we pass down the urethroscopic tube and on into the bladder which we use in a similar manner. One can see the trigone very nicely. One can see the sphincter — all the outlines of its color and shape as it closes or opens, as plainly as you can see the surface of the skin. All these various malformations which the doctor has described can be seen.

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They exist there just exactly the way he has shown them to us. You can also use your cautery knives directly upon such tumors or cysts, a thing which I have not been able to do with my Goldschmidt operating urethroscope.

DR. LELAND BOOGHER of St. Louis: In the treatment of these simple inflammatory conditions of the verumontanum Dr. Swinburne speaks only of the use of silver nitrate. I should like to ask him whether in the urine in those conditions there is not always quite a large drop of mucoid material which appears in the urine when it is passed. This drop is always passed at the end of urination, and in inflammatory conditions of the verumontanum I have never found that drop absent. It would almost fit accurately into the ejaculatory opening. In those cases due to avoidance of sexual intercourse I have used the psychophore with a great deal of success. Following that, if I do not get results, I use cupric sulphate in two per cent solution, thirty drops every second day, gradually increasing to ten or fifteen per cent solutions. This frequently gives relief from the night emissions and the neurological conditions. In all those cases where there are inflammatory conditions of the verumontanum without inflammation of the urethra, I would like to ask if he has not seen that peculiar drop at the end of urination. I have seen all these conditions with the long, straight tube with a direct light. I do not think they are difficult to see.

DR. JOS. L. BOEHM of St. Louis: There is one condition of the deep urethra which I do not believe can be determined when either the Goldschmidt or the Buerger urethroscopes are used. This is retention of urine in the deep urethra, a distinct pathological entity, which is not described in text-books, and which I have observed for several years. To distinguish and differentiate this condition requires a urethroscope in which air dilation is used in the deep urethra, such as the simple Swinburne instrument. Spurious phosphaturia will continue for a long period of time in patients with this condition, which must be distinguished from a phosphaturia of dietetic origin. This condition will not respond to mineral acids or dietetic changes, such as results in simple phosphaturia as we commonly find it to exist. Such a phosphaturia, which we can call spurious, will resist treatment until the condition of the deep urethra is cured, in which there is no longer retention of urine. Dr. Buerger mentioned a weakness of the internal sphincter, determined, as it were, by the urethroscope. It is just this weakness that will

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allow the urine to trickle spasmodically from a bladder into the deep urethra to be retained there indefinitely, depending on the patient's sensibility.

DR. BUERGER, Dr. Rigdon has inquired as to the orifices of the prostatic ducts. They are normally to be seen as little punctate orifices in the sulci laterales, between the frenula and in the fossula prostatica; at times they lie in the colliculus itself. I know they are there much oftener than I can see them. Sometimes I can distinctly see and probe orifices on the verumontanum itself. I have also noted the fact that the outline of the sphincter itself may change with the condition of the bladder, but in my exposition have referred to its appearance when almost empty. The doctor also inquired as to whether larger openings are indications of previous trouble. I think they are. Normal cases do not show the large type of orifice that I have shown in these drawings.

In regard to Dr. Kolischer's discussion, it seems to me that he abrogates to himself a knowledge which is not in keeping with one who has not used the instrument. I think if he would give the instrument a trial his views would change. In regard to my supposed statement that some of the lesions are not to be seen except with the cysto-urethroscope, I may not have made myself clear. I distinctly said in referring to a certain papilloma that it was not seen with the cystoscope except as a shadow, and I remember very well, when showing this at a clinic, that two very good cystoscopists in New York told me they did not believe it was anything. Then we put in the urethroscope, and we saw it as shown in the illustration. My standpoint is that we can see well with this instrument, whereas with other instruments we think we see when we really do not.

As regards edema bullosum, the lesions shown you are certainly not to be identified with it. Even with the Nitze cystoscope, what we are apt to call edema may not be edema at all. For we all know how deceptive lesions appear in the juxta-sphincteric region. Furthermore the cystic changes described by me may be proven to be such by the fact that the endo-urethral knife will cause them to collapse, whereas the lesions that I have designated as proliferative act like solid bodies, being simply incised and made to bleed without shrinking at all.

As regards the view held by Dr. MacGowan that a straight tube gives us as good a view as a telescopic instrument, this is a notion based on an over-valuation of the pictures seen through the ordinary endoscope. It is quite impossible to obtain a

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reliable view when the vascular mucous membrane of the posterior urethra prolapses into the end of a straight tube, and a trial of the telescope in question will convince any one of its great superiority.

DR. SWINBURNE: My paper drew attention to one phase of diseases of the posterior urethra and its treatment, because of the numerous mistakes that are made in the treatment of these cases. They are, it seems to me, very simple to make out, and the symptoms are very definite. One man will do better with one instrument, another man with another. Whether a man uses a straight tube or water dilatation makes very little difference. I have used them all, and I must say that I consider the Buerger cysto-urethroscope as one of the most valuable instruments we have for examining around the neck of the bladder, around the internal urethral orifice. There is another instrument, the latest Wappler, which also gives just as beautiful pictures of the posterior urethra as the Buerger, and is very valuable, it seems to me, in correcting one's views when he uses a simple air instrument. Now the curved tube that I had made was made in order to give comfort to the patient in that class of cases that I spoke of in the treatment. I had used the straight tube for some time before that, and I have been able to discover many of these pathological conditions with my urethroscope, and instead of making it larger I have made it smaller. I now use one made of silver, No. 22 caliber.

In regard to the question about the mucoid discharge in the urine, you very frequently find that mucous condition, and I think you frequently find it where there is no pathological condition, but I think that a large amount of this mucous shows some trouble in the deep canal.

DR. HAWKINS: I feel awfully disappointed that my paper was not the subject of a lot of criticism. I like criticism very much, and previous to this year I have received my fair share of it. As to the examination of the roof of the posterior urethra, spoken of by Dr. MacGowan, I cannot say I have ever noticed a great deal of trouble on the roof, but a great deal on the floor, where are located all those ducts and the verumontanum. Water dilatation, to my mind, is more an aid to diagnosis, as practically everything can be seen with the open instrument, with the exception of the little ducts opening into the posterior urethra, which are naturally more easily discovered when the urethra is dilated with water.

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Those pictures of Dr. Buerger's are very gratifying. A year before Dr. Buerger's instrument was brought to the attention of the profession I made a series of pictures, which I showed in March of last year in Chicago, and the pictures, although crudely drawn, were practically the same as the doctor has shown. I had a number of plates and passed them around, and the pictures shown with the cysto-urethroscope are practically the same. It affords me much satisfaction to see how much progress has been made in the study of the verumontanum. In 1907 or 1908, when I read a paper at Atlantic City, "Some Observations on the Verumontanum," I do not think one person discussed that paper. No person seemed to realize that there was such a field open. I find every meeting I come to that I learn a whole lot about a thing I thought I knew something about four years ago, and I hope men will go right on studying this subject. I believe right in that little spot is the source of all these conditions which cause many men to suicide.

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CLINICAL OBSERVATIONS FROM TWO HUNDRED AND THREE CASES OPERATED FOR RENAL TUBERCULOSIS.

W. F. BRAASCH,
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Cystitis is usually secondary to some extravesical cause, and its cure is accomplished generally by the removal of this cause. It is only within the last few years that we have learned to recognize renal tuberculosis clinically through the persistent bladder irritability which it causes. Certainly no one is justified in treating a case of bladder irritability locally until he has exhausted every means to exclude the existence of renal tuberculosis. Without going into the clinical description of typical cases of renal tuberculosis which has so often been done in recent literature, I will confine my observations to a consideration of the exceptional conditions, the complications and the results in two hundred and three cases of renal tuberculosis operated at St. Mary's Hospital (Mayo Clinic).

Summary of Statistics.

A summary of various data tabulated from the series may be of interest: —

1. *Sex.* There evidently exists a noticeable preponderance of males, in that they constituted sixty-one per cent, or almost two-thirds, of the total number.

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2. *Age.* Although renal tuberculosis is generally considered as being confined largely to the young adult, twenty-nine per cent of our series were above forty years of age.

3. *Hematuria* was found present in sixty per cent of the series. It is of particular interest that it occurred about twice as often in the male as in the female.

4. *The primary symptom* was bladder irritability in eighty-six per cent; renal pain either alone or coincidental with bladder irritability in twenty-five per cent, and hematuria in six per cent of the cases.

5. *Renal Tumor* was palpable in but twenty per cent of the cases.

Closed Pyonephrosis. The pathology of the tuberculous kidney will frequently depend upon the situation, number and character of strictures found in the tuberculous ureter. If the first stricture is near the bladder, a varying dilatation of the ureter above it, and of the renal pelvis, will necessarily follow, depending upon the degree of the constriction. If the first stricture is in the upper ureter, there may be multiple strictures below it. If the ureter becomes closed early, a large pyonephrosis may result; if late, but a caseated remnant of the kidney may remain. When the ureteral constriction becomes so great as to prevent any infecting secretion from reaching the bladder, the process is called "autonephrectomy." In such cases the bladder will often recover, although usually a small amount of the secretion will find its way into the bladder so as to sporadically reinfect it to a varying degree. The bladder symptoms are often obscured by those of pain or tumor, while the absence of pus or tubercle bacilli in the urine may further mislead one. The

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cystoscopic examination must determine the absence of secretion from the affected side, and will usually reveal several areas of ulceration, often situated on the bladder roof. The radiograph may also be of corroborative value by demonstrating the shadows often cast by the calcium deposit in the caseated areas.

Secondary Infection. While, as a rule, the urine with renal tuberculosis is acid and is free from bacteria other than the tubercle bacillus, secondary infection frequently occurs, and the clinical symptoms may be markedly altered. Most observers are agreed that interference with urinary drainage is the usual cause of an ascending infection. A secondary infection in a tuberculous kidney often results from constriction in a tuberculous ureter. The symptoms then noted are variable and may be either of the following: (1) Comparative cessation of bladder symptoms; (2) Pain and tenderness in the kidney area; (3) Fever and chills; (4) Pallor and weakness from toxic absorption. Of particular interest is the marked decrease in bladder irritability which is often noted with secondary infection. It becomes very difficult to demonstrate the tubercle bacillus in the thick purulent urine. The kidney may be so greatly altered by the inflammatory process that its initial tuberculous nature is obscured.

Resistance. To what extent the individual is able to resist and overcome renal tuberculosis infection is still a disputed point. The present trend of opinion is to regard a spontaneous or tuberculin cure as exceptional and one to be regarded with distrust. It would seem that the clinical course might be divided into three general groups, including (1) those cases in whom the course of the renal disease is steadily progressive, which constitute the majority of cases seen; (2) a smaller number of cases which

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are characterized by considerable resisting powers, as evidenced by intervals of spontaneous recovery from their symptoms, followed by periods of recurrence. After a number of years the course of the disease usually becomes progressive. Evidence of localization of the process is sometimes seen in the surrounding areas of scar tissue, cystic degeneration or dormant circumscribed foci; (3) a few cases with but little evidence of this infection other than a few pus cells and tubercle bacilli from the affected side which may persist over a period of more or less than a year, and then under general treatment or tuberculin disappear entirely.

Various observers have reported cases of symptomatic cure from an evident well-advanced renal tuberculosis. Before such a recovery is established definitely, enough time must elapse to exclude a possible recurrence. Furthermore, a closed ureter or so-called "autonephrectomy" is not an uncommon occurrence and would be followed by a symptomatic cure.

Of considerable interest is the increased resistance to renal tuberculosis, as seen in the older adult. In our series twenty-nine per cent were over forty-five years of age, showing that it is not an uncommon infection above that age. With most of these patients the symptoms were moderate and of several years' existence. The bladder lesions were often those of a mild cystitis. The kidney lesions were usually well localized and not extensive.

Ascending Bladder Infection. It is now generally conceded that primary bladder infection may be disregarded as a clinical entity, and that it follows either a descending or ascending infection. The relative percentage of descending and ascending infections has been variously estimated, the latter as high as twenty per cent. However, it would seem that an exact relative estimate would be quite impossible because

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of the difficulty in identifying the bladder infection as tuberculous. During the past three years we have made a cystoscopic examination in thirty-seven patients with tuberculosis of either epididymis, testicle or prostate, complaining of bladder symptoms, in whom renal infection was excluded. Of this number twenty-three showed no evidence of actual bladder inflammation, and we must regard their symptoms due to extra-vesical irritation or possibly a slight inflammation in the prostatic urethra. Nine cases showed a moderate degree of inflammation confined to the base of the bladder without any evidence of tubercle or ulcer. Finally, there remains a small number of patients (5) in whom the bladder appeared quite markedly inflamed, with areas of superficial ulceration strongly suggestive of actual tuberculous infection. The demonstration of the tubercle bacillus in the voided urine would hardly identify the bladder infection, because the bacillus may come from the infected prostate or seminal vesicle. In our experience the number of undoubted tuberculous bladders from an ascending infection have been less than five per cent.

Complications. The tuberculous infection was confined to the kidney in but a comparatively small percentage of cases that came to operation. The ureter was found infected to a varying degree in most of the cases. While it may be difficult to say whether the infection in the bladder is actually tuberculous or not in some cases, judging from the severity of ulceration and persistence of symptoms after nephrectomy, in more than two-thirds of the cases the bladder became infected. In order of frequency the extra-urinary complications in our series were found to be as follows: one male genital, two pulmonary, three osseous, and four joint.

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Male genital. In over 60% of the cases of renal tuberculosis evidence of the disease was found in the epididymis, testicle, vas deferens or prostate. The epididymis was most often affected, the changes varying from a nodular thickening to a tumor the size of an orange. Usually but a portion of the testicle, if at all, is found infected. Palpable tuberculous changes in the prostate occur in over 40% of the male cases. The changes will vary from a moderate nodular thickening, which is usually found, to a diffuse, irregular boggy tumor, and often one lobe is larger than the other. Clinical evidence of infection in the seminal vesicle occurs less often. Evidence of the disease in the male genitals should be looked for as a routine procedure, and is often of considerable corroborative evidence. Genital infection *per se* offers, as a rule, no contraindication to nephrectomy. With a large prostatic abscess and a perineal fistula, or when the patient is otherwise extremely weak, the value of a nephrectomy might be problematical.

Pulmonary. In twelve of the cases operated definite changes in the lungs were demonstrated clinically, some of which showed marked involvement. Of these, six cases recovered. Providing that the general condition of the patient is otherwise good, a moderate pulmonary infection should be no contraindication to operation. While pulmonary tuberculosis is not a common complication of early unilateral renal tuberculosis, it frequently occurs with long-standing or bilateral renal tuberculosis.

Bone and joint tuberculosis was found in seven cases operated upon for renal tuberculosis. Neither infection offers any contraindication to nephrectomy, providing that the patient's general condition is otherwise good.

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Differential Diagnosis. The errors in clinical diagnosis in our series have been made in the differential diagnosis of pyelitis, kidney stone, stricture of the lower ureter, single kidney and cold abscess.

Pyelitis. As a rule, the clinical picture and cystoscopic examination will readily differentiate a pyelitis. When, however, the cloudy urine is unilateral and the bladder appears ulcerated and contracted, confusion may easily arise unless the presence of the tubercle bacillus can be demonstrated. Demonstration of cortical abscesses in the collargol plate may be of considerable value. If necessary guinea pig inoculation should be made.

Kidney Stone. Calcareous deposits in caseated tuberculous foci may simulate lithiasis. Since the case history in renal lithiasis and tuberculosis may be identical we must rely largely upon the cystoscopic data and the demonstration of the tubercle bacillus for a diagnosis. The character of the radiograph shadow is usually suggestive of its tuberculous nature. The occasional presence of secondary stone deposits in the residual urine of advanced tuberculous kidneys must also be remembered.

Single Kidney. With a congenital single or atrophic kidney, and a chronic ulcerative cystitis, one might easily infer that the absent kidney was destroyed by the so-called auto-nephrectomy which occasionally happens with a closed tuberculous kidney.

Cold Abscess. Patients with a lumbar abscess of renal origin not infrequently appear with little or no urinary symptoms or findings. Cystoscopic examination will demonstrate the absence of secretion from the affected kidney. Injecting collargol through the external sinus and then radiographing will often trace the abscess to its origin. With a tuberculous kidney necrosis the sinus may attain an extraordinary depth, extending even as far as the bony pelvis.

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Radiograph Data. The calcium deposit in caseated foci of tuberculous kidneys will often cause shadows to appear in the radiograph. The shadow is usually of three general types: (1) the cast of the caseated kidney, entirely or in part; (2) single irregular shadows of varying size outlining the caseated center of tuberculous foci; (3) multiple small irregular shadows scattered over the kidney area. Not all areas of caseation will cast a shadow, however; in fact, the majority will not. It is impossible to judge from its microscopic characteristics whether the caseated area would cast a shadow. The shadows vary greatly in density from a thin film to a distinct outline, and are usually more hazy and irregular edged than the stone shadow. The diagnosis of lithiasis based upon such shadows is a common clinical error.

Of considerable interest and often of practical value have been the injected radiograph (pyelograph) of tuberculous kidneys and of those suspected of being tuberculous. Many tuberculous kidneys removed after an infection of several months' duration will show areas of cortical necrosis in direct communication with the renal pelvis. This can be outlined clinically in the injected radiograph (collargol) without any detriment to the patient. When the necrotic process is extensive the pelvis may appear markedly irregular and greatly dilated in the pyelograph. The pelvis with non-tuberculous pyelitis, on the other hand, while usually appearing moderately enlarged, is not so irregular nor will it show any cortical abscesses.

Dilatation above constriction in the tuberculous ureter may be outlined in the injected radiograph. With a primary stricture near the bladder the resulting hydro-ureter may simulate that of a congenital or traumatic obstruction.

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Cystoscopic Technic. In reviewing the literature descriptive of cystoscopic technic in the tuberculous bladder, one might easily gain the impression that the appearance of the bladder and meati, as well as the ureteral data, were quite uniform. One would be led to expect to find typical ulceration or tubercles, confined largely to the affected side; the affected meatus is described as being "golf-hole" or markedly ulcerated, with cloudy urine exuding, while the other meatus appears normal. Although such a picture may be found in many cases, in the majority it will not be found. The technic involved in finding and catheterizing the tuberculous ureter is the most difficult in cystoscopy, as is evidenced by the many errors and failures made even by competent endoscopists.

In reviewing the many difficulties and possible sources of error encountered, the following were found most often: (1) A papillomatous proliferation of the mucosa as the result of the severe inflammation and irritation of tuberculous cystitis may be so extensive as to be mistaken for a malignant papilloma. This false papilloma or granulation tissue is more often seen with a tuberculous cystitis than with any other bladder inflammation. It may be low and flattened by distending the bladder, or it may be a pedicled cauliflower-like growth. It may be particularly confusing if either ureteral orifice is so hidden in the growth as to render inspection or catheterization impossible, or if at the time of examination but little pus and no tubercle bacilli are found in the urine. It may be necessary to obtain a specimen of the growth through the cystoscope for laboratory examination to determine its identity. (2) The ureteral orifice on the normal side may appear even more diseased than that of the diseased side. The bladder segment of the ureter on the well side may

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become infected from the severe cystitis, with consequent dilatation and rigidity. It may become so retracted as to form a false diverticulum of the bladder wall. (3) Erroneous observations are easily made as to the amount and character of urinary secretions. As a result of irritation caused by the cystoscope the bladder wall may so contract that little or no urine may be seen to escape from either meatus during five to ten minutes. With marked inflammatory dilatation of the bladder ureter on either side, retained cloudy bladder fluid, when exuding, may give the impression that the secretion from that side is purulent. (4) Obstruction to the ureteral catheter preventing successful catheterization is quite frequently met with. If, on the diseased side, which occurs more often, it is usually due to constriction following ureteral ulceration. On the normal side the obstruction is usually at the meatus or intramural as the result of cicatrical changes following marked inflammation or ulceration in the bladder wall. (5) Urine catheterized from the well side may be contaminated with a few pus cells and possibly tubercle bacilli scraped from the bladder mucosa in introducing the ureteral catheter. Such an error might easily lead to an erroneous diagnosis of a bilateral infection.

Where the condition of the healthy kidney cannot be determined through cystoscopy surgical exploration is necessary. Whenever this was deemed necessary in our series both kidneys were found diseased.

Bilateral Tuberculosis. Although various observers have regarded the bilateral infection as usually occurring simultaneously, it would seem, from our series, that in the majority of cases the second kidney becomes infected several years after the first one. Of cases diagnosed as bilateral tuberculosis and

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regarded as inoperable, the majority gave a history of evident renal infection dating back from two to ten years. The course of the second infection may often be traced by the history of a comparatively recent exacerbation of bladder symptoms and pronounced general weakness occurring several years after the first infection. This is, furthermore, often borne out at operation where bilateral exploration not infrequently reveals an old abscessed kidney on one side and a recent small focus in the other. The danger of subsequent infection in the second kidney should be regarded as an urgent argument for early operation. Of five patients in whom bilateral tuberculosis was found at exploration and the badly diseased kidney was removed, all were reported dead within a year after operation. While our results in operating for bilateral tuberculosis are not as satisfactory as those noted by some observers, the operation should occasionally be followed with cure.

Adrenal Gland Involvement. During the past two years we have observed at operation three cases in which the adrenal gland, together with the kidney of the same side, was involved in the tuberculous process. The adrenal gland was found to be fully twice as large as normal and densely adherent to the inflammatory tissue about the kidney. On section, caseated tubercles, varying in size, were found scattered in the substance of the gland in two cases. In the third, the gland, though considerably enlarged, presented only inflammatory changes without any evidence of tubercles. The last patient died three weeks after operation. Autopsy revealed no evidence of tuberculosis in the remaining adrenal. Of the other two patients, one died three months after operation and the other was reported alive after one and one-half years. Clinically, the cases were of exceptional interest from the fact that they ex-

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hibited symptoms which may have been due to the diseased adrenal gland. In two of the patients numerous areas of brown pigmentation of the skin were found in various parts of the body and also on the palate. After operation, the third patient presented marked ecchymoses in the conjunctiva of both eyes, and numerous minute areas of subcutaneous hemorrhage on both legs.

Cause of Post-operative Death. While insufficiency of the remaining kidney has been generally regarded as a frequent cause of death following nephrectomy for renal tuberculosis, it would seem that there are other factors which should be regarded. Every autopsy record of patients dying soon after nephrectomy showed evidences of a severe general toxemia. Cloudy swelling and fatty degeneration of the remaining kidney as well as of the liver, brown atrophy of the heart muscle, miliary tuberculosis in the various organs and peritoneum, were found in practically every case. In one patient, who died of post-operative lobar pneumonia, the remaining kidney showed evidences of chronic and acute nephritis, which otherwise might have been regarded as the direct cause of death. Various observers have shown that albumin and casts disappear from the urine of the remaining kidney after the diseased kidney has been removed. It would seem, therefore, that the evidences of post-operative renal insufficiency are but part of a systematic toxemia, and that the patient's power of resistance is diminished by operation. It hardly seems possible that a laboratory estimation of the kidney function would determine the degree of this resistance.

Summary of Results. Six (2.9 per cent) of the two hundred and three patients operated upon died in the hospital. Excluding those cases operated upon during the past year as being too recent to be of

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statical value, we were able to obtain the subsequent histories of but seventy per cent of the patients. Of this number eighteen per cent was reported dead. Of this eighteen per cent, sixty per cent died during the first year after operation, and fifteen per cent lived more than three years. Of the eighty-two per cent alive, all but thirteen per cent reported improvement or recovery from their previous bladder symptoms. The majority of those reporting no bladder improvement had gained in weight and strength.

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ECHINOCOCCUS CYST OF THE KIDNEY.

W. E. LEIGHTON AND BRANSFORD LEWIS,
ST. LOUIS, MO.

The very rare condition of echinococcus cyst of the kidney, especially in North America, is the reason for presenting this paper and specimen today.

The patient, a white female, entered my service at the St. Louis City Hospital, with the following history: Thirty-five years of age, married, mother of four children. Born in Italy and living in this country two years. She entered the hospital on account of a tumor in the right lumbar region and from which she suffered great pain and distress. The tumor had been present about four years, to the best of her knowledge, and had gradually increased in size until she was no longer able to work from its size, feeling of weight and intense pain. Family history negative. Past history, fever for a month after childbirth.

Physical examination: Poorly nourished, emaciated, and skin sallow. Lungs negative. Heart enlarged; apex in seventh interspace outside nipple line. Blowing systolic murmur present. Inspection of abdomen revealed a tumor in right lumbar region, which bulged outward and forward. Percussion showed it to extend from the border of the ribs to the iliac fossa, and about one inch to the left of the middle line. Tumor was smooth, rounded, and solid to touch, except at a point near the umbilicus, where it felt soft or cystic. While the tumor was continuous with the liver dullness, it was movable. The tumor occu-

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pied the space of the right kidney. Left not enlarged. Spleen not palpable.

Urinary examination showed a specific gravity of 1020 acid; contained a trace of albumen, but no sugar. Sediment showed a few fine granular casts, round and squamous epithelium, and many leucocytes.

A tumor of the right kidney was diagnosed, the nature of which was uncertain. Patient was seen by Dr. George Crandall and Dr. Bransford Lewis, who made a cystoscopic examination. The left ureter was catheterized and clear urine collected. The right ureter could only be catheterized for about one inch, from which oozed a turbid fluid. Samples were collected and examined. That from the right ureter showed only pus cells, with no kidney elements, while that from the left corresponded with the previous urinary examination and showed a chronic nephritis of the left kidney.

Our efforts to determine the nature of the tumor being fruitless, and having ascertained that there were two kidneys, we decided to perform an exploratory operation, as the patient was losing ground.

On March 26, 1911, under ether anæsthesia, we exposed the right kidney by an oblique lumbar incision. The kidney was readily exposed, but instead of the usual appearance of the kidney we found a white, hard tumor, similar to a thick-walled ovarian cyst. A line of cleavage having been found the tumor was readily freed from its capsule, except at a point where it was adherent to the ascending colon. While attempting to free this the tumor ruptured, and a small amount of fluid, with many egg-like bodies, escaped. Up to this time the nature of the tumor was doubtful, but the egg-like bodies suggested a parasitic nature, which was demonstrated at the close of the operation by finding the scolices. With

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the escape of the contents there was felt only a thin walled sac, which represented the remnant of the kidney. Being unable to separate this for fear of injuring the large intestine, we were obliged to cut off and leave a portion of the sac attached. The pedicle and remainder of the sac were ligated and removed. Drainage and suture of the wound completed the operation.

The patient experienced considerable shock, but rallied toward evening. The wound drained well for several days. The patient passed nine or ten ounces of urine daily. Temperature never reached above 100.6. The pulse, however, was weak and rapid. Thirst was extreme and vomiting persisted from the first. She was slightly delirious at times until the 30th, when she became comatose and died the next morning.

Unfortunately no autopsy could be obtained, but the lungs, heart, spleen and other kidney were removed through the operative wound. No other cysts were found. The heart was dilated and showed an insufficient mitral valve. The left kidney was enlarged, red, and showed chronic changes.

Pathologic report of the tumor by Dr. Harris showed chronic inflammatory changes of the cyst wall, but no evidence of functionating kidney tissue, except a few scattered tubules. The fluid from the cyst showed scolices and hooklets.

The etiology of this disease is interesting. Lyon, searching through the literature of the United States and Canada, found two hundred and forty-one cases of echinococcus cyst reported up to July 1, 1900. Among this number were nine cases of hydatids of the kidney, and three of these showed cysts of other organs. Since that time I have been able to find only one other case, which, with the one I have described, make a total of eleven cases of echinococcus

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cyst of the kidney occurring in North America. In Lyon's tabulated cases the kidney was affected in 3.7 per cent. Finsen places it at 1.17 per cent, Thomas of Australia, 0.65 per cent and Morris 5.4 per cent. The latter figures, according to Gardner, who has had considerable experience with the disease, is too large, and he is supported by Crandall and Vegas of Buenos Ayres, who collected 1,696 cases of hydatid disease and found the kidney affected in 0.21 per cent.

The bibliography and abstract of the cases are as follows: —

Cases 23, 34, 80, 84, 85, 108, 109, 143 and 181 are abstracted by Lyon: *Journal American Medical Assn.*, 1902, Vol. 123.

Case 23, Marsh, 1869: *Cincinnati Lancet & Obst.*, N. S., XII, 539–543. Kidney tumor removed at autopsy. Male, fifty-three years of age. Indian Hill, Ohio.

Case 34, Fauntleroy, 1878: *Virg. Med. Monthly*, Richmond, IV, 282–284. Tumor of kidney. Forty-five years. Staunton, Va.

Case 80, Stavely, A. L., 1889: *Montreal Med. Journal*, XVIII, 148–150. Male, forty-three years of age. Russian (Pole). Reading, Pa. Cyst right kidney, hooklets.

Case 84, Kinjoun, 1890: *U. S. Marine Hospital Rep.*, XLIX, 147–149. Male, thirty-eight years of age. Swede. New York City. Cysts in liver, kidney and bladder.

Case 85, Allaben, 1891: *North Am. Pract.*, Chicago, III, 612–617. Female, fifty-two years of age. German. Argyle, Ill. Mul. cyst in bladder, pelvis, liver, spleen and kidney, omentum, peritoneum, diaphragm

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and pericardium. Had passed cysts per rectum. Hydatid removed from abdominal cavity, 1879.

Case 108, 109, Ferguson, A. H., 1893: *Northwestern Lancet*, XIII, 41–48. Icelander. Winnipeg. Kidney.

Case 143, Keyes and Busch, 1896: *Buffalo Med. Journal*, XXXV, 25–29. Male, fifty-three years of age. German. Buffalo, N. Y. Multiple cyst in lung, omentum mesentery, subdiaphragmatic left kidney, and sac of left unguinal hernia, scolices and hooklets.

Case 181, Mercier, O. F., 1900: *L'union Med. de Canada*, Montreal, XXIV, N. S., Vol. 427–38. Male, fifty-five years of age. Canadian. Montreal, Quebec. Large cyst in region of right kidney. Daughter, cysts.

Haynes, 1902: *Annals of Surgery*, 36–95. Male. Italian. Living in New York. Hydatid cyst of kidney found accidentally during an operation for appendicitis. Kidney removed. Patient died from pneumonia.

Geographically echinococcus disease is found especially in Iceland, Germany, Australia, Italy and Argentine Republic, and among those classes who associate closely with dogs. In this country it is extremely rare and a great majority of all cases is in foreigners.

The tenia echinococcus is a tiny, thread-like cestode, 4 to 5 mm. in length, found among the villi of the upper part of the intestine of the dog. It consists of three or four segments. The head is small and provided with four sucking disks and a rostellum surrounded by a double row of twenty-five to fifty hooklets. The terminal segment, called the proglottis, alone is mature, and contains about five thousand eggs, within each one of which is a small embryo or oncosphere. The terminal segment of this cestode is dis-

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charged in the feces of the dog, and the egg, which is said not to be very resistent, gains access to the intermediate host (sheep, cattle, hog, man, etc.) through contaminated food or drinking water, or in the case of man, possibly from hands soiled while petting dogs. On arriving in the stomach the enveloping membrane is digested and the oncosphere or six-hooked embryo bores its way into the various parts of the body, or is carried by the blood and lymph to distant organs. Here it comes to rest and undergoes the following changes: The hooklets disappear and the little embryo is converted into a small cyst which presents two distinct layers — an external, laminated membrane or capsule, and an internal granular layer, the endocyst. The cystic fluid has a specific gravity of 1005 to 1009; does not contain albumen, but does contain sugar, and as a rule scolices or hydatid heads and hooklets are present. Outside of the external layer an inflammatory reaction takes place in the tissues and a dense fibrous tissue develops, which is known as the ectocyst. Later, buds develop from the granular layer, which are gradually converted into cysts, called "daughter cysts," presenting a structure identical with that of the parent cyst. Inside the daughter cysts a similar process may occur and granddaughter cysts are developed. From the lining membrane of parent and daughter cysts buds arise, which develop into brood capsules. Within or upon the walls of these brood capsules scolices or larvæ develop. When fully developed the scolex measures about 19 by 16 mm. and represent the head of the tenia echinococcus, presenting four sucking disks and hooklets. Each scolex, when transferred to the intestine of a dog, is capable of developing into a tapeworm. In cases of multiple echinococcus cysts of the peritoneal cavity, it has been shown that the disease may

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develop from a rupture of the primary cyst, and the escaping scolices becoming emplanted or grafted upon the surrounding tissue may produce secondary cysts.

The symptoms are often absent until the tumor is so large as to attract attention to it. Pain from pressure may be present when the tumor is large enough to impinge upon other organs. Suppuration of the contents are accompanied by chills, fever and sweating. Rupture of the cyst into the urinary pelvis is characterized by attacks simulating renal colic, with passage of daughter cysts, or scolices and hooklets.

The diagnosis of echinococcus cyst of the kidney is not easy. "Among twenty-eight cases cited by Morris, in which renal hydatids have been submitted to operation, there were thirteen in which errors in diagnosis were made, four in which the operator was undecided, and eleven only in which a corrected opinion had been formed. Renal hydatids have been mistaken for ovarian, mesenteric and splenic cysts, and for the following tumors of the kidney: (1) Hydro-nephrosis, (2) simple cyst of the kidney, (3) polycystic disease of the kidney, and (4) cystic sarcoma of the kidney."

A cyst with tense walls, containing little fluid and many daughter cysts, as in this case, can be hardly differentiated from tumors of the kidney. Fremitus, when found, is absolutely diagnostic of the condition, but unfortunately is not often found. It is obtained by placing the hand on the tumor and tapping sharply with the other, when a thrill will be imparted to the fingers. The same can be obtained by auscultory percussion. Finding scolices or hooklets in the urine or aspirated fluid is also positive. The serum-reaction gives promise of great assistance along the line of diagnosis, but as yet is only in the

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experimental stage of development. "In the absence of the hydatid fremitus, the escape of the cyst contents by the urethra, the serum reaction, or the result of aspiration or exploratory incision, a positive diagnosis can scarcely be made."

The prognosis depends upon the duration of the disease, the extent of the envolvement, and complications, such as suppuration, rupture, etc. The operative mortality is high for nephrectomy, but practically nil for nephorostomy.

The treatment for hydatid cysts of the kidney is surgical. Conservative surgery should be practiced, and the kidney or any portion of it should be saved if possible. Three operative procedures are available, depending upon the extent of the destruction of the kidney: (1) Nephrectomy may be performed where the kidney substance appears to have been entirely destroyed by compression. The mortality from the operation is 21.47 per cent. (2) Nephrostomy or marsupialization is the choice of most operators on account of its simplicity and low mortality, which is about 6.12 per cent. (3) Resection has been performed ten times with two deaths. The lumbar route should be employed, since there is less danger of hydatid intoxication and emplanatation of scolices.

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DISCUSSION

OF PAPERS OF DRS. BRAASCH AND LEIGHTON.

DR. HUGH CABOT of Boston: I want to thank Dr. Braasch for this paper, because it seems to me a very important contribution on an extremely important subject. He has brought us the well-digested results of a large number of cases which will help us in deciding important problems. I want to ask him to give us further enlightenment upon two questions which seem to me of paramount importance. In the first place, what method or methods he depends upon for identifying the tubercle bacillus, in what proportion of cases he employs staining, how reliable he finds that to be and in what proportion of cases he employs guinea pigs. Second, what methods he depends upon to pass upon the soundness of the other kidney, — how he establishes in his own mind the safety or danger of operation, — in other words, how he will decide what cases to pass and to deny operation, and in what cases to undertake it with the probability of a very low mortality, as his cases have shown.

DR. BRANSFORD LEWIS of St. Louis: The clinical lesson of this echinococcus kidney to me was very striking. When the tumor was opened up and there came the outburst of these cysts, the situation was very dramatic, I assure you. I had never made the acquaintance of an echinococcus cyst before, and the situation was new to me entirely. Though we had made numerous surmises during the operation, we had not arrived at a diagnosis until that time. I imagine there are some in this audience who would be in a similar situation, and in that light we wanted to bring the history and the case to the Association. The next time I run across a cataract of soft bodies like alligator eggs flowing out of a tumor I will be in a little better position to appreciate the actual condition of affairs.

DR. GRANVILLE MACGOWAN of Los Angeles: In looking over my copy of the transactions of the meeting of L'Association d'Urologie française, for the year 1910, recently, I noticed an article by Dr. Victor Nicaise upon this subject, in which it is stated that hydatid cysts of the kidney bear the relation of two and one-half per cent to hydatid cysts in general, and that from a diagnostic point of view, it is not possible to be sure,

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before operation, of the nature of the disease. The hooks are usually found, but not always, and to find the hooks, it is necessary that the liquid contain the heads of the tinea, and that the mother or daughter cysts are, or have been, fertile. Sometimes, however, they are not fertile, acephalous. There is, however, one mark just as characteristic as the hooks, that is, the foliated aspect of the membranes in sections. No other parasite possesses vesicle walls stratified like the leaves of a book or of an onion.

DR. DANIEL N. EISENDRATH of Chicago: I want to speak on the question of mixed infection. I think the lamentable thing about the diagnosis in these cases is that so frequently cases are interpreted as pyelonephritis, due to the colon bacillus or staphylococci or streptococci, until the kidney is almost absolutely gone, and often until there is infection on the opposite side. I have had occasion during the past few years to see some of these cases. One of these had been treated over a year as a simple pyelonephritis until, after repeated searches, the tubercle bacilli had been found in the urine. A man fifty-two years of age, who had otherwise enjoyed the best of health, had suddenly been seized with repeated attacks of typical pyelonephritis — namely, sudden chills, a temperature of 105 and 106 and sweats. A great many of such cases are treated as malaria, and this case was, because the man traveled about in a great many parts of the country, until finally he was treated here by a physician who referred the case to me. It was a very puzzling clinical picture for three weeks. Although the physician himself had on one occasion found a few tubercle bacilli, it wasn't until after we had searched the urine ten or twelve times that we found a few again. During that three weeks the recurrent symptoms of chill, fever and sweat took place two or three times, and then the examination of the urine, the cystoscopic examination and the ureteral catheterization confirmed our diagnosis. The examination showed also the colon bacillus.

Another case which I have seen in the last three months was a young man who had been treated three months on account of a suspected pyenephrosis, with pus in the urine and fever, and it was only on the appearance of perinephritis that he was referred to the surgeon. There was a large perinephritic abscess, and a kidney that was simply debris.

The tendency for the gonococcus to form a more favorable field for secondary infection with the tubercle — I have seen this in several cases in tuberculosis of the epididymis and testis, and also in one case of tuberculosis of the kidney, where there

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was first a very acute onset, like a gonorrhœal epididymitis usually has, abscess formation, draining from the epididymis, later on the urine showing both gonococci and tubercle, and later an ascending infection to the kidneys. I think we do not dwell on this point frequently enough.

DR. G. KOLISCHER of Chicago: I was very glad to hear Dr. Braasch's report. He pointed out that the difficulties in diagnosing by cystoscopy tuberculosis of the bladder and kidney are occasionally great. The tuberculous bladder frequently becomes intolerant. If we flush it out it won't hold fluid or permit any instrumentation after that. In young women it is a good thing, as suggested by Fenwick years ago, to cystoscope the bladder when it is distended with urine. A few hours before the cystoscopy we give the patient an abundance of water, and then we can cystoscope a bladder which could not be cystoscoped after the rountine preparation. Dr. Braasch also called attention to the fact that the changes around the ureteral openings are not always as characteristic as we are told. That is true. But there is a way of getting around this difficulty. If you give such a patient tuberculin and then cystoscope during the time of reaction you will be surprised how pronounced these changes become. They become so pronounced that we are able to make a diagnosis.

DR. BRAASCH: The clinical identification of the tuberculous infection in the kidney is often a difficult and tedious procedure. As a rule we rely upon the finding of acid fast bacilli in the catheterized bladder urine which has been obtained after carefully cleansing the external genitals and urethra. In this way contamination by smegma bacilli can be ruled out for all practical purposes. Thorough examination of the sediment of repeated specimens thus obtained should always be made. The tubercle bacillus can be found in the urine of practically every case of *early* renal tuberculosis. In cases of long standing, with much destruction of kidney tissue, it may be impossible to find the bacillus. We have been able to find the bacillus in seventy per cent of our cases. When it is impossible to find the tubercle bacillus, and when the clinical symptoms demand further identification guinea pig inoculation should be resorted to, which is undoubtedly the most accurate test. Unfortunately, the inoculation requires a long time to elapse before the infection can be identified, and, therefore, is often impractical. The clinical findings, the results of the cystoscopic examination

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and a careful examination of the catheterized bladder urine will usually suffice to make the diagnosis.

As to the method of ascertaining the functional condition of the remaining kidney: That again is a difficult problem to deal with. I am inclined to think that the subject has not been solved as yet. Every now and then there will be a fresh outbreak of functional tests, and sooner or later these various new methods are proven to be more or less uncertain. We have not relied very much upon the chemical functional tests. We have relied largely upon the clinical evidence, together with urinary and cystoscopic examination. If we find that there is no pus in the urine catheterized from the supposedly normal kidney, and that there is plenty of secretion in a specified time; if the patient's condition is otherwise fair and if the capacity of the other kidney is markedly diminished, we will go ahead and take out the kidney which we think is diseased. Certainly it is the only chance the patient has. Our results, I am inclined to think, bear us out in our practice.

It has been asked what dependence we put in the von Pirquet reaction. It has not proven satisfactory in our hands. I dare say it is the experience of most observers that it will be positive when there are evidences of disease in other parts of the body, so that, while it may indicate the presence of tuberculosis, the process is not necessarily localized in the kidney.

DR. LEIGHTON: I am very glad that Dr. Lewis brought out the point that we did not make a diagnosis. I did not mean to convey the idea that we had made a diagnosis at the time of the operation, but it was suggested by some one present that it was parasitic in nature. The cause of death in this case, in my opinion, was the fact that we had to leave a portion of the cyst in the wound, and that death was due to the anaphylactic reaction from that. It has been definitely proven experimentally that the injection of a slight amount of hydatid fluid in the tissues will produce an extreme degree of shock; and that is the condition this woman presented in the five days preceding death.

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RENAL VARIX.

PAUL MONROE PILCHER,
BROOKLYN, N. Y.

Among the relatively large number of cases of hematuria which have come under our care during the past ten years, there have been several which presented no other symptom than the presence of blood in the urine. However, the source of the hemorrhage has been satisfactorily explained in each case. Of these, four were typical cases of renal varix, the history of one of which I will give in detail.

Case I. Patient referred by Dr. Harold Jewett. A man aged fifty years. Malaria and scarlet fever as a child, no veneral history. Four years previous to examination, without known cause, his urine became dark red or chocolate colored. This discoloration of the urine lasted a month or two and then suddenly disappeared, and the urine became clear again.

Status Præsens: The patient had been drinking heavily. In October, 1908, he noticed the return of his former condition. There was no symptom other than a large amount of blood in the urine. This was more marked in the morning on rising and cleared up somewhat as the day progressed. There was some increased frequency of urination during the day. He was very nervous and lost considerably in weight. Physical examination showed his heart to be normal, his liver enlarged, but otherwise negative.

Examination of the urine showed the specimen to

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be loaded with blood, the cells sinking rapidly to the bottom of the glass container and the supernatant fluid retaining its red color, showing the presence of free hemoglobin. Iron and quinine were administered in various forms; in November, the fluid extract of ergot, in one-half dram dose every four hours was exhibited. At this time the urine was still loaded with blood. Two days after he began taking the ergot, the urine became perfectly clear and remained so for two days, then it was more bloody than before. This continued for a number of days, and then, without any medication, the urine became clear again and remained so for a few days and the blood reappeared. December 10, 1908, it was clear, and remained clear the 10th, 11th and the 12th of December, then the blood reappeared and was present off and on until April, 1909. Cystoscopic examination showed blood coming from the left ureter. The writer presented the history of the case before the Brooklyn Surgical Society and made a clinical diagnosis of renal varix.

May 1, 1909, the patient consulted Dr. Hugh Young of Baltimore. He also found hemorrhage coming from the left kidney. He injected the pelvis of this kidney with three drams of a 1 in 500 adrenalin chloride solution. After a day or two the hemorrhage stopped and it did not return for about ten days. He returned to Brooklyn in the same condition as before.

January 11, 1910, cystoscopic examination showed the left ureter opening normal in appearance and secreting blood-tinged urine at regular intervals. There was a moderate number of leucocytes, a few renal cells, and with a few epithelial and red blood cells being excreted from the renal pelvis. Bacteriological examination of the urine from the left kidney was negative. The renal pelvis was washed out with

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adrenalin chloride solution in order to check the hemorrhage temporarily.

Operation by the writer: At the end of a week the left kidney was exposed and was found to be surrounded by a mass of fat and many fibrous bands, which bound the kidney down. These were separated with much difficulty. In order to bring the kidney up out of the wound it was necessary to resect the twelfth rib. The kidney was somewhat congested and enlarged. It was bisected along Broedel's line, and the pelvis and all of the calyces were opened. The papillæ at the upper pole of the kidney were congested, and one of the lower papillæ showed on its surface minute varicosities which gave it a roughened, granulated appearance, making it appear somewhat whiter than the other papillæ. After the kidney had been thoroughly inspected and the varicose and congested condition of the papillæ noted and demonstrated to a number of the surgeons who were present, the two halves of the kidney were brought together and sutured with two layers of mattress sutures, using No. 2 plain catgut. The capsule of the kidney was sutured with a separate catgut suture, a drain was inserted into the lower and central portions of the wound and the rest of the wound closed. The patient made an uneventful recovery, the blood disappearing completely from the urine within seven days after the operation. It is now nearly two years since the operation, and although the patient has continued the daily consumption of a large quantity of whiskey, there has not been a trace of the blood in the urine since the operation.

The history of all these cases is very much alike. The patient usually in good health, suddenly notices the presence of blood in the urine. There is nothing to account for its presence; there has been no undue exercise, no injury, no infection, no history of renal

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colic; no pus cells, epithelial elements, crystals, tubercle bacilli, or other abnormal ingredient found in the urine, other than blood, which is at first small in amount, then either increasing or decreasing, and oftentimes absent altogether; in some cases the amount of blood is influenced by exercise, while in others this plays no part. In two cases of my own, the quantity of blood seemed to be greater in the morning and to lessen as the day advanced. It occurs with varying frequency in both men and women over twenty-five years of age. Some patients have had alcoholic habits, while others have been total abstainers; in fact, there is no type of person in whom the disease has been more frequently observed. The hemorrhage may last but a few days only to disappear and recur again after periods of weeks or months or even years, or again, it may be continuous from the first, causing progressive anemia.

As a rule, the urine is loaded with blood, and at times with free hemoglobin; the blood cells are evenly distributed throughout the urine, appearing in all parts of it as it is evacuated from the bladder; clots may be found in the bladder, to be expelled at intervals; as the specimen stands, the cells rapidly fall to the bottom of the glass container; and it has been observed in my own cases that the urine retains its reddish color after precipitation of the cells, probably due to free hemoglobin.

The urine shows no evidence of renal disease other than a reaction for albumin in proportion to the amount of accompanying blood serum, excepting where nephritis is present, a condition which of itself may give rise to hematuria, but which should not be classed with these cases.

Rarely the patients complain of pain or distress in the affected kidney or over the bladder, but it has been observed in some cases that all of the pain and

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discomfort have been referred to the opposite kidney. The disease is always unilateral; and no cases, so far as I can learn, have ever been reported where the disease affected both kidneys. It is true that symptomless hematuria is frequently bilateral; but those are the cases due to malaria, hemophilia, drug-poisoning, nephritis or other cause quite different from those included in the present report.

In the *Annals of Surgery*, May, 1909, the first report of my cases was set forth, together with a study of similar cases obtained from other writings. Fenwick[1] of London, first called attention to the occurrence of angioma or capillary nævus of a renal papilla as the cause of painless hematuria. He reported three cases in which distinct vascular abnormalities were found in one of the papillæ of the kidney; two of these cases were cured by papillectomy and one by nephrectomy. In his first case, the vessels of the mucous membrane covering the papillæ were markedly varicose; in the second case, a bright red varicose condition similar to the first case was found; in each, recovery followed removal of the affected papilla. In the third case, in which nephrectomy was done, a dark purple papilla appeared and a little blood was seen oozing from a point in the apex. He also reported three other cases, in two of which simple nephrotomy was done, followed by recovery; and one in which nephrectomy was done and the kidney found to be the seat of subacute nephritis. In the three latter cases, no abnormal condition of the papillæ was definitely made out.

In March, 1908, Whitney and Cabot[2] reported a case in which the tips of one or two of the papillæ at one end of the kidney were reddened and a little spongy; the microscopical examination showed the small venules at the tip of the papilla irregularly

[1] Fenwick, H.: "Clinical Cystoscopy," London, 1904, p. 392.
[2] Whitney and Cabot: *Boston Medical and Surgical Journal*, Vol. clviii, No. 21.

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dilated, and covered on their free surface with a fine film of connective tissue and a single layer of epithelial cells, projecting here and there as varicose knuckles; no well-marked thrombi were found. The straight tubules of this region contained blood corpuscles, which were not found higher up, indicating this to be the source of the hemorrhage. MacGowan[1] has also reported several interesting cases of painless hemorrhage from the kidney, which were relieved by operation.

During the past year two cases have come under my personal care which belong properly in this class: —

Case II: (Referred by Dr. William Moser): Man, aged sixty-two years, janitor by occupation, was admitted to the German Hospital of Brooklyn, on August 26, 1908. Non-alcoholic, had never suffered from scarlet fever, rheumatism, diphtheria or malaria. Has had bleeding hemorrhoids for several years. In November, 1907, he first noticed blood in his urine; this was shortly after an attack of influenza, and there were no other symptoms referable to the genito-urinary tract excepting some increased frequency of micturition; the hematuria was said to have been constant. The urine was constantly loaded with blood, and he often passed clots of blood; he would void his urine three or four times during the night. In this condition he presented himself for treatment. He had an apathetic expression, and was anemic rather than cachectic; the eyes were slightly sunken and watery; his temporal and radial vessels showed a very slight arteriosclerosis; he stated that he had lost considerable in weight; his bleeding hemorrhoids had caused him a good deal of suffering.

A rectal examination showed dilated hemorrhoidal veins that were oozing. Cystoscopic examination showed some congestion about the mouth of the left

[1] MacGowan, Granville: *American Journal of Urology*, June, 1908.

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ureter. Urine drawn from the left kidney was bloody, that drawn from the right kidney was clear. His condition became so grave that he at last consented to an operation. At this time his hemoglobin was found to be thirty-five per cent. Morphologically, the red blood cells showed advanced poikilocytosis with marked anemia; lymphocytes were all small. In this desperate condition he was subjected to operation on December 12, 1908, by the writer. A rapid nephrectomy was done without any seeming shock to the patient. Upon exposing the kidney it was found to be congested and the pelvis was swollen with contained bloody urine; there were no macroscopic changes in the kidney itself. The patient reacted well from the operation. Twenty-four hours after the operation his condition was perfectly normal; the urine passed was clear, showing that the source of the hemorrhage had been removed. At midnight he was sleeping normally, with temperature 98.4, pulse 90 and respirations 30. Shortly after that it was noticed that his respirations were more rapid, his pulse becoming weaker; at 2 A.M. there was a sudden dilatation of the heart, and at 2.10 A.M. he died, forty hours after the operation.

Examination of the removed kidney showed it to be normal in size, the parenchyma was normal, and no signs of nephritis were present; there was a small cyst in the cortex filled with clear fluid. Sections were taken from the papillæ, and a typical condition of varix was found; the numerous venous and arteriocapillary spaces were markedly dilated, so that in places there was but a thin wall of cells between a number of blood sinuses, and on the surface the sinuses approached so nearly the mucous membrane that the slightest violence would probably cause their rupture; a rupture of these, however, was not necessary, as a transudation of the blood cells and of

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the blood elements would be easy through so thin-walled a vessel if on an exposed surface.

It is emphasized that macroscopically nothing whatever was discernible in the kidney to indicate the varicose condition of the papillæ. I know of no pervious case in which the condition has been proven to exist; all the cases reported, as already outlined, have shown macroscopic changes that drew the attention of the operator to one or another of the papillæ, and, in some cases, actually oozing points were seen. A more complete report of this case appears in the *Annals of Surgery*, May, 1909.

Case III (Referred by Dr. V. W. Weed): Woman twenty-eight years old. Four months previous to examination she discovered blood in her urine evenly mixed with the same, and a few drops following the close of micturition; catheter specimen was bloody; there was never any colicky pain; two months ago she began to have some increased frequency of urination. Has lost twenty pounds in weight, and is steadily growing weaker; aside from this she does not complain of anything except the blood that she passed whenever she urinated; she stated that even after a night's rest the urine was as bloody as it was at the end of an active day.

Examination of the patient revealed a woman of slight build, moderately anemic; heart and lungs normal; the right kidney was slightly enlarged, somewhat tender, and freely movable as far as the pelvic brim. The left kidney was slightly movable. Urine, specific gravity 1.017; acid; trace of albumin; no sugar; blood cells. Cystoscopic examination, April 20, 1908: no point of hemorrhage was found in the bladder; urine that came from the right ureter opening was distinctly abnormal. Both ureters were catheterized,

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and the urine obtained from the right kidney contained a small amount of blood; that from the left kidney was normal.

Operation, April 30, 1908, at the German Hospital. The kidney was found to be partially turned upon itself, without, however, any torsion of the ureter; the organ was enlarged and its central portion seemed to be somewhat grayer in color than the two poles; a pedicle clamp protected by rubber tubing was used to compress the renal vessels. The kidney was then split from pole to pole, a little posterior to its median line, down to the pelvis; no abnormality of any kind could be found. The pelvis was carefully examined and was found perfectly normal in size and position; palpation of the kidney demonstrated no abnormalities. Four mattress sutures of catgut were used to bring the split surfaces of the kidney in due apposition and hold them there; the peripheral edges of the kidney were brought together with catgut sutures; after the clamp was removed — having been in place about four minutes — there was free oozing from the kidney and it was found necessary to put in a few additional sutures. The kidney was then fixed to the muscular structures by four stay sutures of chromic gut, and the wound closed, with the exception of an elliptical space one and one-half inches long by one-half inch wide, which was packed with iodoform gauze. The patient stood the operation very well; during the first twenty-four hours there was considerable oozing of blood and urine from the wound, but during the next twenty-four hours this entirely ceased. An uneventful recovery followed, the wound healing per primam.

On the fifth day after the operation there were no microscopic or macroscopic blood elements to be found in the urine. From that day until present, now three and a half years, she has remained entirely

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well and has gained greatly in weight; she has never had the slightest trace of blood in her urine since the operation.

In considering this case, the first point worthy of attention is the fact that the blood has been present in the urine without intermission for four months; that it was just as bad, if not worse, in the morning as at night; that there was a considerable amount of free hemoglobin present in the urine; that she was thoroughly anemic rather than cachectic. No microscopical section was made in this case, and no removal of kidney tissue was done. The clinical condition found at operation and the complete subsequent relief to the bleeding, following the nephrotomy, illustrated in an ideal degree the characteristics of the lesion under discussion.

Case IV: A man forty-six years of age. On April 2, 1911, first noticed a large amount of blood in his urine. There were no other symptoms at first, but later on the same day he had some pain in the region of the left kidney. It resembled the pain arising from renal calculus. The next day a cystoscopic examination revealed a partly organized blood clot blocking the left ureter opening. An X-ray examination was negative. April 29, 1911, the left kidney was exposed and bisected. The uppermost papilla showed tortuous venules just beneath the mucous membrane. The two halves of the kidney were brought together and held by mattress sutures. He made an uneventful recovery and at the present writing, five months after the operation, he remains well.

There have been other cases which have come under my observation, which were not subjected to operation and although I feel sure that they were cases

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which belong properly in this class, I cannot include them among the proven cases.

In conclusion I will give again the result of my study of these cases.

(1) Renal varix is a distinct pathological entity, and may be described as an angiomatous disease of the papillæ renales, whose etiology and pathology resemble that of varicocele, varicose veins of the leg, varicosities at the cardiac end of the stomach, hemorrhoidal varices, etc.

(2) Many of the so-called cases of essential hematuria are due to this condition of the kidney.

(3) It has its own distinct symptomatology; but it may be impossible to differentiate it, before operation, from hematuria due to nephritis and hematuria due to renal papilloma.

(4) In the majority of cases, at operation, when the kidney has been bisected, no gross pathological lesions will be noted, but on microscopic examination of the papillæ renales a typical angiomatous disease will be found.

(5) Renal decapsulation and fixation of the kidney will cure the cases of unilateral hematuria due to nephritis.

(6) Nephrotomy is the operation of choice, because it allows a thorough examination of the kidney, and also for the reason that it accomplishes exactly what the operation of multiple ligature does in the treatment of varicosities in other portions of the body, in that six of the main connecting and collecting venous radicles of the kidney are severed and permanently closed, and the course of the blood stream is instantly changed to the anastomoses at the upper and lower poles of the kidney, and in this way the varicosities are destroyed.

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(7) The incision should be made along Broedel's line so as to avoid injury to the arteries.

(8) Nephrectomy is indicated only when rapid bloodless operation is demanded, or when nephrotomy fails to relieve the hematuria.

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CASE OF PROFUSE UNILATERAL RENAL HEMORRHAGE. NEPHRECTOMY. PATHOLOGICAL REPORT.

H. A. FOWLER,
WASHINGTON, D. C.

John T., colored, laborer, aged twenty-six years, came to the out-patient clinic of Freedmen's Hospital, April 12, 1911, complaining of passing bloody urine. About one month before he first noticed that the urine was bloody. Since that time the hematuria has been continuous. In the beginning the urine was markedly bloody, but more recently the amount of blood has greatly increased, and with every urination large clots are voided.

The onset was insidious, without apparent cause, and without any associated symptom or disturbance, local or general. Very recently he has noticed a slight pain in the region of the left kidney. This pain has been so slight as to attract little attention, and was mentioned only after close questioning.

The family history is unimportant in the present connection. He has been generally healthy up to the onset of the present trouble, except for an attack of typhoid fever, in 1909. There is no history of injury, operation, or venereal disease. He uses alcohol moderately and smokes excessively.

Examination: The patient presents most striking fascies on account of the marked anemia. The pallor of the face is extreme. The mucous membranes and finger nails are pale and bloodless. He complains of

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great weakness and is easily exhausted. The external genetalia are normal. The urine voided in three glasses is uniformly very bloody, with numerous large clots in the first glass. No long, worm-like clots were seen in the voided specimen. The microscopic examination showed only red cells. There were no pus cells present.

Examination of the chest and abdomen was negative. There was no tenderness or muscular rigidity on deep palpation over the left kidney. Neither kidney could be felt.

He was admitted to the hospital and put to bed. On the following day a cystoscopic examination was made. The bladder was washed clear with great difficulty, the return flow, even after repeated irrigations, containing considerable blood. On this account it was thought probable that the hemorrhage was vesical in origin. The cystoscope, however, showed a long, worm-like clot coiled up on the floor of the bladder. It was the blood washed from this clot which had colored our irrigating solution and led us to believe that probably the hemorrhage was from the bladder. A large, round clot, completely filling the orifice, was projecting from the left ureteral opening. With each contraction of the ureter this clot would protrude further from the opening and then draw up again into the ureter with the completion of the peristaltic wave. A small, fine streak of bright red blood was seen issuing from the orifice on the inner side of the clot and trickling down over the trigone. Attempts to dislodge the clot by massage over the kidney and along the ureter were unsuccessful. The right orifice was normal and from it clear urine was issuing at normal intervals. The bladder was otherwise normal.

The X-ray plate was negative for stone. Tubercle bacilli were not found. Under complete rest in bed

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and internal medication the hemorrhage continued. The pulse and respirations began to show the effects of the loss of blood, the patient grew weaker, and his condition became alarming. It was therefore decided to operate as the only means of stopping the hemorrhage and saving the patient's life. Accordingly the kidney was rapidly exposed, delivered, the pedicle clamped and the kidney removed. Very little blood was lost. The blood was extremely thin and watery and left only a slight stain on the sponges.

Recovery was rapid and uninterrupted. The patient left the hospital on the twentieth day. The urine was free from blood on the day following the operation, clear amber in color, and contained no albumin. Following the operation a very marked change developed in the patient's condition and appearance. The anemia began to clear up promptly with the checking of the bleeding.

The kidney was very pale and anemic, but normal in size and contour. On section the cortex appeared normal except for the extreme anemia. No abnormality could be made out in the pelvis or in the papillæ. Nothing could be discovered on close inspection to account for the hemorrhage or suggest a clue as to its etiology.

Dr. J. S. Neate of the Army Medical School has kindly examined the specimen for me, with special reference to determining, if possible, the cause of the hemorrhage. His report follows: —

HISTOLOGICAL EXAMINATION OF A KIDNEY REMOVED FOR HEMATURIA.

The kidney when received was over twenty-four hours old and somewhat air dried, the outer cortex was therefore shrunken and had to be disregarded in the examination. It was sectioned and preserved in Orth's fluid. The entire kidney was cut up into

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pieces one-eighth inch in thickness, and examined with a lens for evidences of varices in the papillæ. In all fourteen pieces were embedded, sectioned and studied microscopically, in a futile effort to find an adequate cause for the hemorrhage.

The kidney in general was found to be bloodless; very few intact red blood cells were found, their places being occupied by shadows and homogeneous pink-tinted coagula.

From the viewpoint of the etiology of this condition (hematuria) the degree of nephritis present is practically negligible. The capsules of the glomeruli are found to be everywhere distended and the contained tufts shrunken in appearance, richly cellular, with evidences of proliferation of their covering cells. Bowman's capsules are almost uniformly but moderately thickened, and their lining endothelium shows irregularity in arrangement and excessive proliferation. Quite a few of these capsules contain a homogeneous, hemoglobin-stained exudate, while a small number of them are represented by whorls of fibrous tissue, the result of chronic passive congestion.

The epithelium of the convoluted tubules exhibits a fine granular degeneration, these cells show ragged edges, many "dropped" nuclei, and there is present a moderate amount of débris in the lumina. Connective tissue increase is nowhere conspicuous, and the lesion is of the parenchymatous type.

The epithelium of the collecting tubules is fairly well preserved, but many of these give the appearance of having been unusually distended, and the presence in many of them of hemoglobin-tinted coagula suggests blood as the cause; a few indeed are so much distended as to be rightly denominated cysts, and these also are filled with the albuminous exudate before referred to.

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Between the tubules of the papillæ there are irregular areas of hyaline degeneration, a few distended capillaries and minute interstitial hemorrhages, but none of sufficient extent to explain the excessive amount of blood lost by the patient. An examination of the apices of the papillæ, together with their outlet ducts, reveals no varices or telangiectatic condition of the blood vessels. Many of the ducts, however, contain vestiges of the hemoglobin-tinted coagula.

Some of the medium-sized arteries and a few of the arterioles exhibit degeneration in their walls, chiefly evidenced by nodular areas of excessive proliferation of cells in the intima and media, an irregularly distributed condition of endarteritis, but not confined to any particular part of the kidney. With appropriate staining many foci of bacteria can be demonstrated in these degenerated areas and in the surrounding adventitial tissue. But much stress cannot be laid on the presence of these bacteria, because delay in the preservation of the specimen permitted of the post-mortem multiplication of micro-organisms, and in addition their presence is not accompanied by the cellular and leucocytic reaction we are accustomed to see under such conditions.

Another feature which invites attention, both macroscopically and microscopically, is the distention of some of the large veins. Ten areas were noted in which they are conspicuous; a number of these were located near the apices of the papillæ and the others at the junction of the cortex with the medula. Now these large veins, while not exceeding in size those frequently found in chronic lesions of the kidney, because of their evident irregularity when contrasted with similar regions of the same kidney, merit some consideration in this connection. Their condition at

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least indicates the lack of the vascular tone and equilibrium we assume must be present.

From the examination of a large number of sections, in some cases serial, from this kidney, we may say that no angiomatous or varicose condition exists in the vessels of the papillæ sufficient to account for the hemorrhages, such as have been described in similar cases by other investigators. On the other hand, there appears to be evidence that much of the hemorrhage, or at least excretion of hemoglobin, occurred by way of the glomeruli and tubules, as shown by their distended condition and the collections of laked blood both in the capsules and in the cystic distentions in the course of the tubules.

In addition we have present patches of endarteritis and irregularly distended veins, and while it is possible that considerable blood might have escaped through rupture of such damaged vessels, no microscopical evidence of such occurrence has been found.

A better knowledge of the condition of the capillaries of the glomeruli is much to be desired in this case, but is unfortunately not obtainable, owing to the faulty preservation of the specimen.

In conclusion we feel that an adequate explanation of the hematuria in this case has not been discovered from the histological examination, and that, like some similar cases, it must remain in the column of "cause unknown."

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THE DIAGNOSTIC VALUE OF THE SHADOWGRAPH CATHETER.

LOUIS E. SCHMIDT AND HERMAN L. KRETSCHMER,
CHICAGO, ILL.

In several previous communications we have called attention to the value of the shadowgraph ureteral catheter as an aid in determining the topography of the ureter, and also of its value when combined with simultaneous catheterization of the vas deferens, for clinically demonstrating the crossing of the vas deferens and the ureter. In the latter publication we suggested that the shadowgraph catheter, when combined with simultaneous skiagraphy of the vas deferens, might be of value in locating doubtful shadows in the pelvis, perhaps having their origin in the seminal vesicles. The present paper will consider only pathological cases in which the shadowgraph catheter was used for purposes of diagnosis, demonstrating its clinical value, as well as considering its limitations.

For practical purposes we have divided the pathological cases into three arbitrary groups.

I. Lesions of the kidneys.
II. Lesions of the ureter.
III. Pelvic shadows of extra-ureteral origin.

I. Lesions of the Kidney

The kidney cases which we wish to present have been divided into the following groups: —

(*a*) Anomalies of position.
(*b*) Abnormalities of mobility.

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(*c*) Changes in the renal pelvis.
(*d*) Renal calculi.

I—*a*. *Anomalies of Position.* A consideration of the anomalies in position of the kidney is best discussed under two headings; namely, congenital and acquired malpositions. A congenitally misplaced kidney is one which has never occupied its normal position and is associated with malformation in the vessels and ureter. An acquired dystopic kidney is one which originally occupied its normal position, but which has become loosened, so that a movable or floating kidney was present for a variable length of time. A movable kidney could then, for one reason or another, become fixed in an abnormal position, so that we would be dealing with an acquired dystopic kidney. The differentiation between a congenital and an acquired dystopic kidney can be made by means of the shadowgraph catheter. This differentiation is based on the fact that in the congenital cases an anomaly of the ureter is always present. In the acquired cases the ureter was originally long enough to permit the kidney to occupy its normal position. Consequently, when such a kidney becomes fixed in an abnormal position its ureter will show abnormalities of its course, but not of its length, so that when a shadowgraph catheter is introduced into such a ureter, various windings and deviations in its course are seen in the shadowgram. A congenitally dystopic kidney presents the opposite picture. In this group of cases the ureter is shorter than normal, and being only long enough to reach from the abnormally placed kidney to the bladder, the shadowgraph catheter shows a shorter and more or less direct course of the ureter.

Abnormal positions of the kidney are of clinical importance chiefly from the standpoint of differential

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diagnosis. Inasmuch as they occur in almost any position in the abdomen, are very rarely if ever characterized by a typical symptom complex, and are usually associated with negative urinary findings, it becomes necessary to consider this condition in the differential diagnosis of all abdominal tumors. Just what pathological lesions must be considered in each differential diagnosis will vary in the individual cases.

As an illustration of the value of the shadowgraph catheter in the differential diagnosis of an abdominal tumor, we wish to present the following case: —

Case I. (Figure 1 .) Mrs. S., a very stout woman, giving a history of abdominal pain around the umbilicus, associated with occasional attacks of nausea and vomiting. At times pain could be elicited upon deep pressure over the umbilicus. An indefinite, rounded mass, of solid consistency, could be palpated in the median line. In order to exclude a lesion of the kidney, double-sided ureteral catherization, with fuse-wire catheters, combined with X-ray, was undertaken. On the right side the catheter can be seen passing up to the normal position of the kidney, the end of the catheter passing to the upper border of the last rib. On the left side the catheter stops at a point corresponding to the lower border of the third lumbar vertebra. The straight course of the shadowgraph catheter up to its end leads us to believe that we are dealing with a congenital dystopic kidney.

I—*b*. *Abnormalities of Mobility.* Physiologically, the kidney possesses a certain degree of mobility, which corresponds with respiration. In lean patients one is often able to palpate both kidneys easily, especially when the abdominal walls are lax, and if the kidneys possess a little more than their normal degree of mobility. Under these circumstances, such

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a kidney probably would not be a factor in the differential diagnosis of abdominal tumors. If, on the other hand, a kidney is very movable, and if this mobility is associated with more or less enlargement, it must oftentimes be taken into consideration. The difficulties of differential diagnosis are much increased in very stout persons, in whom it may often be impossible to carry out satisfactory palpation.

As illustrations of the value of the shadowgraph catheter in this class of cases we wish to present the following two instances: —

Case II. Mr. W., age forty years. The patient was a very stout man, and palpation was unsatisfactory. About three or four years ago he had noticed a fullness in the upper right quadrant of the abdomen. This swelling has never given rise to any subjective symptoms, either general or urinary. The tumor has remained stationary in size for the past year, so far as the patient could determine. On examination, a tumor was outlined in the right upper quadrant of the abdomen. It was difficult to determine the exact size and consistency of the tumor because of the thick, fat, abdominal walls. Here we were dealing with a symptomless tumor in the right upper quadrant of the abdomen, of slow growth, in a patient who was in good general health. The differential diagnosis rested between hydrops of the gall bladder, Schnürlapen, and a movable kidney. Tumors of the omentum and mesentery, either solid or cystic, were also considered.

It occurred to us that the simplest procedure to carry out would be to exclude the kidney. A shadowgraph catheter was passed without any difficulty and an X-ray picture taken. Then the tumor was displaced by grasping it with the hand and holding it as far to the left of its apparently normal position in

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Fig. 1.

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the right upper quadrant of the abdomen as possible. Then a second X-ray picture was taken. In the first picture the wire can be seen passing upward, parallel to the spinal column, to the normal position of the kidney. The second picture, made after displacing the tumor, shows the shadowgraph catheter passing upward to the left, crossing the spinal column obliquely, from below upward and outward. It was evident, therefore, that the tumor under consideration was the kidney, and that in displacing it to the left, it pulled the ureter with it, so that the probable diagnosis of movable kidney, made when the patient was first seen, was verified.

Case III. (Figures 2 and 3.) Mrs. M., age twenty-eight years. Three years ago the patient was operated on for appendicitis. For the past fourteen months she has been suffering from diffuse abdominal pain, the pain being without any relation to urination, defæcation or menstruation. The physical examination showed the heart and lungs to be normal. The lower border of the stomach, dilated with seidlitz powders, was two finger breadths below the umbilicus. The left kidney was movable. The right was slightly enlarged and could be freely moved about both up and down, and it could also be completely displaced and held to the left to the median line.

In order to determine positively whether the mass was the kidney or not, a shadowgraph catheter was passed into the kidney and an X-ray taken. In the first picture, the catheter, after traversing the pelvis and passing upward, bends inward toward the median line, then sharply turns upward, forming almost a right angle; it then passes upward parallel with the spine, to terminate in the normal position of the kidney. In the second picture, made after displacing

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the tumor, the catheter presents an interesting course. Instead of terminating in the normal position of the kidney, the end of the catheter is seen over the body of the fourth lumbar vertebra. The right angle seen in the first picture has been changed to an obtuse angle; the course of the ureter, instead of being upward on the right side of the spine and parallel to it, crosses the vertebræ, passing upward to the level of the fourth lumbar vertebra, being well to the left of the spine; it then forms a loop, passing finally downward and outward. The diagnosis of movable kidney was, therefore, substantiated.

I–*c*. *Changes in the Renal Pelvis.* Although changes in the renal pelvis are probably best shown by injecting into it some of the colloidal silver salts, the shadowgraph catheter can also be used for demonstrating enlarged and otherwise changed pelves. That the colloidal silver salts give far more definite and complete radiographic pictures must be admitted.

Case IV. (Figure 4.) Miss T., age twenty-four years. About seven months ago the patient first noticed that her urine was very bloody. The hematuria persisted for about eight weeks and was entirely without pain. Since the initial attack, the subsequent hematurias have lasted for a few days only. In the intervals between the attacks of hematuria the urine was normal, so far as she could tell. Three months after the onset of the last hemorrhage she had some vague pain in the back. At present this is more of a dull ache than a real pain. Cystoscopy revealed a normal bladder.

A shadowgraph catheter was passed and an X-ray picture taken (Dr. H. E. Potter). If we follow the course of the catheter upward, we see that it passes slightly inward toward the median line. After reach-

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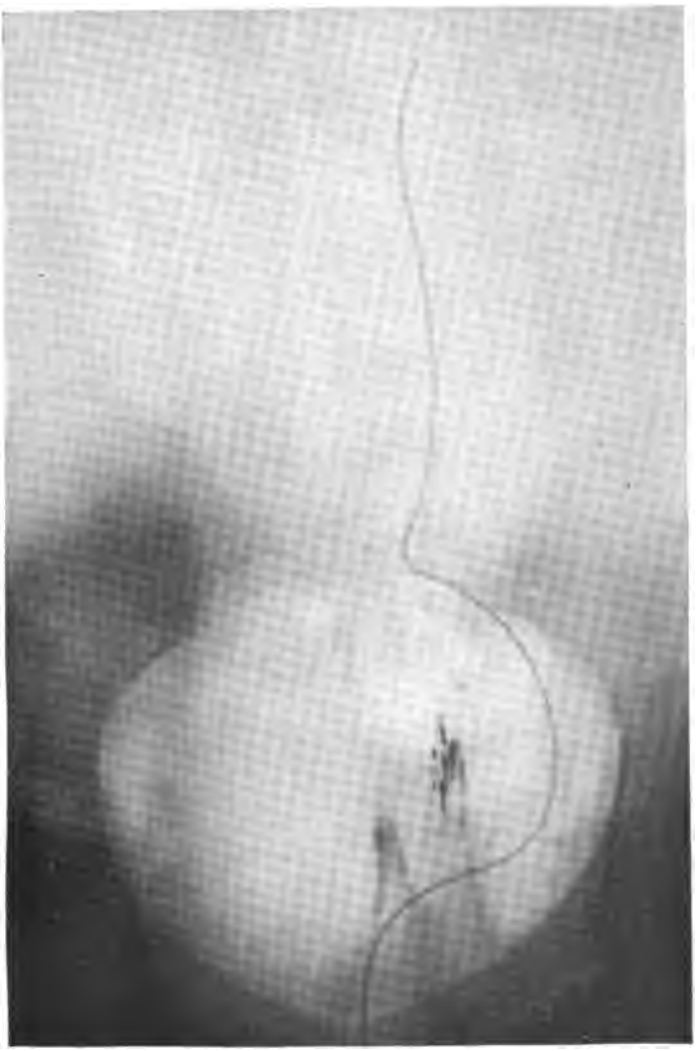

Fig. 2.

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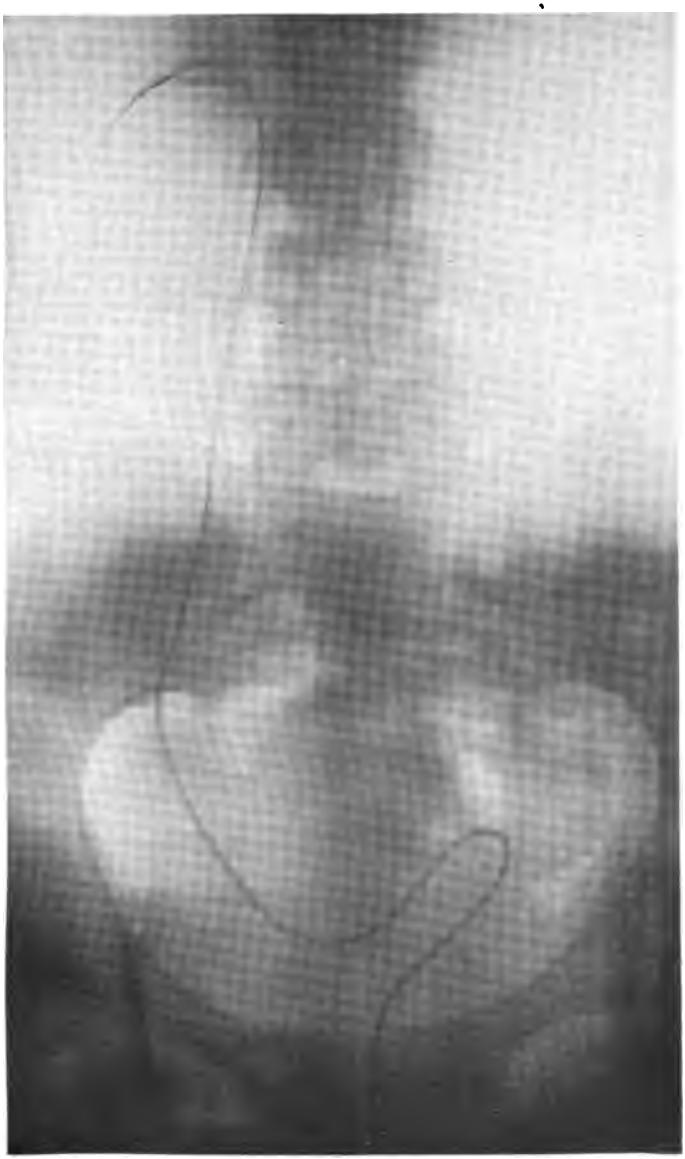

Fig. 4.

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ing the lower border of the transverse process of the second lumbar vertebra, the catheter passes outward and downward to terminate on the level of the transverse process of the third lumbar vertebra.

From the peculiar course taken by the catheter at its upper end two possibilities can be considered in explaining the pathological condition present: (1) That we are dealing with a dilated pelvis which allows the catheter to take this peculiar course; (2) That we have here a movable kidney which seems to be fixed in its present somewhat low position. This point could have been definitely determined by injecting the pelvis with cargentos and taking momentary exposures, or by measuring the capacity of the pelvis.

I–*d*. *Renal Calculi*. For various reasons it often becomes necessary to demonstrate beyond any possibility of a doubt that a given shadow on the X-ray plate, occurring in the kidney region, is produced by a stone in the kidney. If the calculus is large, branching, and extending up into the calyces, it is quite easy to state positively that the given shadow is of renal origin. It would not be quite so easy if the shadow were small and more or less round or oval. Then two possibilities would arise: (1) The kidney may be absent on this side and the shadow be produced by a calcareous lymph node or any one of several other well-known pathological conditions capable of producing shadows in this area; (2) or the stone may be situated in the upper end of the ureter, and inasmuch as the operative interference is quite different, depending upon whether the stone is in the parenchyma or pelvis of the kidney or in the upper end of the ureter, it is desirable to determine this fact, if possible, before operation.

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(One of us once saw a normal kidney removed when the stone was in the upper part of the ureter.)

We wish to present the following two cases in which the shadowgraph catheter was used for localizing renal stone: —

Case V. (Figure 5.) Mrs. L., age twenty-eight years. The patient's present illness extends over a period of four or five years. The only symptoms of which she complains are eructations of gas and vomiting. The first physician called diagnosed appendicitis and immediately removed the appendix. No relief from the symptoms followed this procedure. She then consulted another physician who also diagnosed appendicitis, and performed a second appendectomy, informing the patient that he removed the balance of the appendix left by the first operator.

The presence of pus in the urine led to a cystoscopic examination and ureteral catheterization, which demonstrated the presence of pus in the urine obtained from the left kidney. The first X-ray picture taken showed an indefinite shadow in the region of the left kidney, and it was decided to pass a shadowgraph catheter and take an X-ray picture with the catheter *in situ*. This shows the shadow behind the last rib and the catheter stopping a short distance below the stone shadow. A diagnosis of stone in the parenchyma of the kidney was made and verified by operation.

Case VI. (Figure 6.) Mr. P. The patient had been suffering from severe attacks of renal colic. He stated that with the subsidence of the pain he voided large amounts of urine. The X-ray showed the presence of a shadow in the kidney region. For purposes of accurate diagnosis a shadowgraph catheter was passed and another X-ray picture taken

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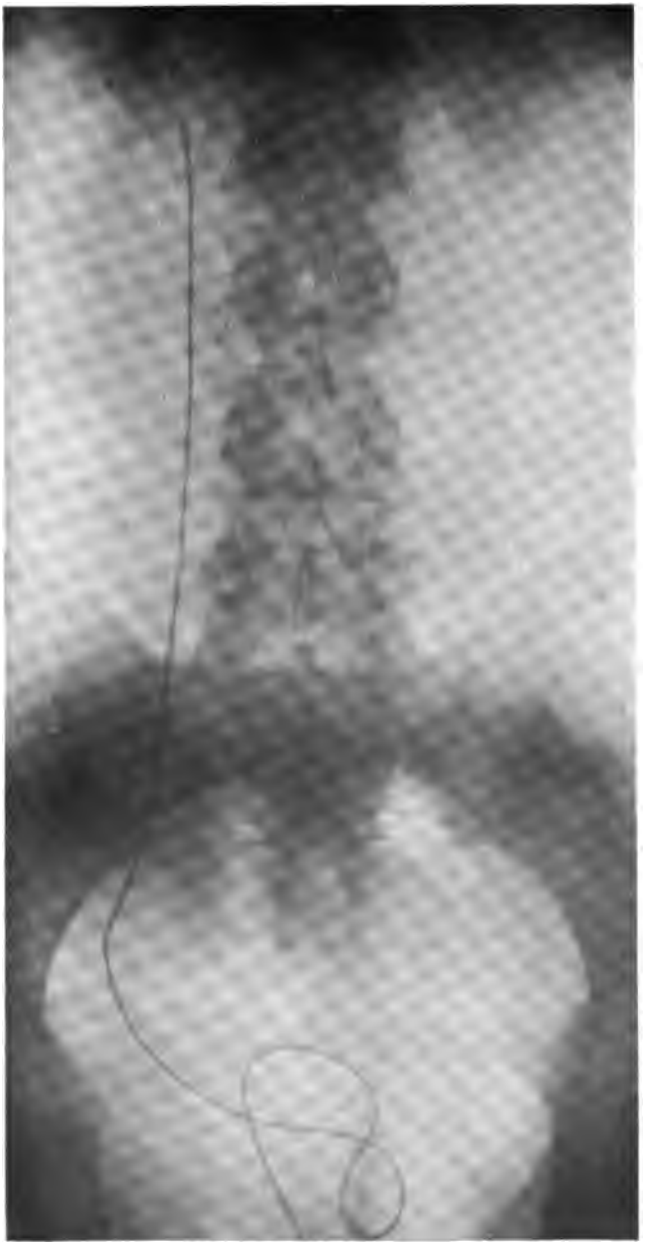

Fig. 5.

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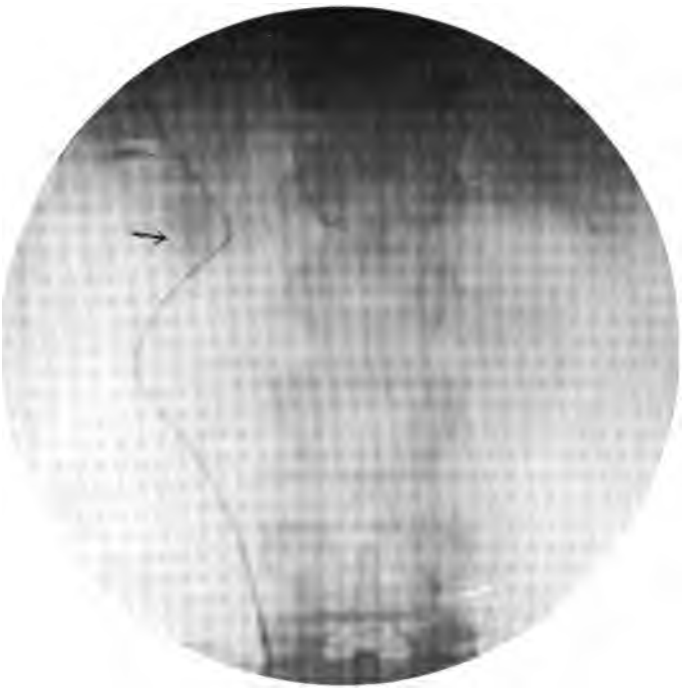

Fig. 6.

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which shows the presence of a stone in a dilated pelvis, the wire passing beyond the stone.

II. Lesions of the Ureter.

The lesions of the ureter which we have considered are: —

(*a*) Anomalies of number.
(*b*) Obstruction.
(*c*) Stone.

II–*a*. *A Case of Triple Ureters.*

Case VII. (Figure 7.) Mr. D. M., age twenty-five years. The patient stated that he has been suffering from chronic urethritis for one year. He was given the usual routine treatment for a reasonable period of time without any appreciable improvement in his condition. For the purpose of excluding a lesion in the bladder, which might be a factor in keeping up his trouble, the patient was cystoscoped. During this cystoscopic examination, two ureteral orifices were found on the right side and one ureteral orifice on the left side. We then decided to pass three shadowgraph catheters, one into each of the three ureteral orifices, at one sitting. This procedure was carried out without the slightest difficulty. The two ureters on the right side were catheterized at once by means of a double direct catheterizing cystoscope, which was then removed, and the left ureter catheterized by means of a single direct catheterizing cystoscope. With the three catheters *in situ* the patient was exposed to the X-ray.

The left ureter does not present anything special for our consideration at this time. If we follow the courses of the two ureters on the right side it will be seen that they cross at a point that appears to be just above the brim of the pelvis, so that the inner

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one, in passing upward, becomes the outer one, and the outer becomes the inner. Above the crossing point we note that the inner catheter passes higher up than does the outer one.

In this particular case all three ureteral orifices were normal and there was no connection between this congenital anomaly and his chronic urethral trouble.

That one of these three ureters may become infected with gonococci and remain as a focus of reinfection for many years has been shown by Bransford Lewis's case, in which gonococci were isolated from the urine of one ureter in a patient who was the possessor of three ureters.

This anomaly is seen at rare intervals at the post-mortem table, but so far as we know, Lewis's, Tilden Brown's and our own are the only ones in which this anomaly was demonstrated in this manner in the living subject.

II–*b*. *Obstruction of the Ureter. — Stricture of the Ureter.*

We have also employed the shadowgraph catheter for the purpose of demonstrating an incomplete obstruction of the ureter, probably due to a stricture.

Case VIII (Figures 8 and 9). The patient's only symptom was pain in the pelvis, very low on the left side. A No. 6 ureteral catheter was passed into the left ureter, and met an obstruction about one inch above the ureteral orifice. After eight or nine attempts to pass the No. 6 catheter beyond this point were all unsuccessful, a No. 4 catheter, armed with fuse wire, was used. This passed the obstruction without any difficulty. Three subsequent attempts with the No. 4 catheter were successful each time.

We recognize the fact that great care must be exercised in making a diagnosis of ureteral obstruc-

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Fig. 7.

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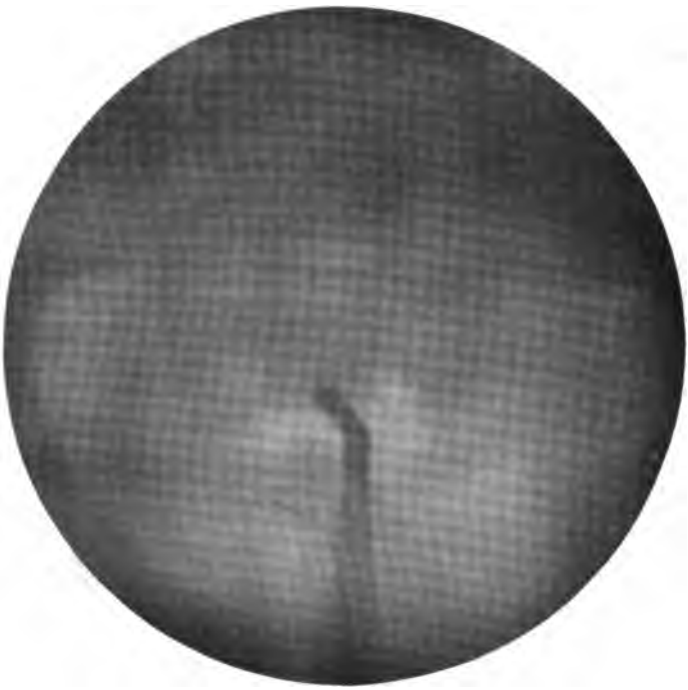

Fig. 8.

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Fig. 9.

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tion by the passage of a ureteral catheter. Passing a catheter part way up the ureter and then being unable to pass it any further does not, by any means, justify one in making a diagnosis of ureteral stricture, as many other factors may produce an obstruction to the passage of the catheter, such as spasm of the ureter. But when one meets with an obstruction to a, say No. 6, catheter each and every time an attempt is made to pass it, and a smaller catheter (No. 4) passes each time, one is then probably justified in concluding that the obstruction is due to a stricture, when stone can be excluded, as was done in this case. Injections of cargentos showed a dilated ureter above the point of obstruction.

II–*c*. *Stone of the Ureter.*

Case IX. Dr. D., age fifty-eight years. The patient states that for the past three or four years he has noticed some dribbling at the end of urination. He was never obliged to void urine at night until about two months ago; since then he urinates once during the night. For the past two months the urine has been bloody. Once during the past summer he voided smoky urine, which upon examination, revealed the presence of blood and pus. The retention was ten cubic centimeters. The rectal examination was negative.

Cystoscopy showed the presence of a mild cystitis. The left ureteral orifice was negative. A small flake of muco-pus was adhering to the right ureteral orifice. An X-ray picture (Dr. H. E. Potter) shows the presence of a shadow opposite the third lumbar vertebra. To determine accurately the position of the stone, a shadowgraph catheter was passed and a second X-ray picture taken, which showed the tip of the catheter stopping at the shadow.

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III. Pelvic Shadows of Extra-Ureteral Origin.

The frequency with which various indefinite shadows are found in skiagrams of the bony pelvis is familiar to workers in Roentgenology, as well as to those engaged in surgery of the urinary organs. Because of their frequent occurrence they become factors which must be taken into consideration in the differential diagnosis of ureteral calculi.

On account of the simplicity of the shadowgraph catheter method, as well as its accurate results, it is advisable to determine thereby the exact origin of these shadows before undertaking any operative interference, particularly in those cases in which there is a typical history of disturbance in the upper urinary tract, either with or without obscure physical findings.

The nature of the bodies which produce these shadows is of minor importance. Various conditions may be present in an individual case, any one or several of which may be capable of producing these shadows. Among the commoner causes we may briefly mention: calcified lymph nodes, phleboliths, atheromatous changes in the blood vessels, calcified pelvic ligaments, concretions in the prostate or seminal vesicles, fecal concretions, etc. It is of far more clinical importance to determine the location of the shadow-producing body with reference to the ureter than it is to establish its nature. As previously demonstrated, the course of the ureter is quite variable, and hence it is impossible to determine the location of the suspected calculus without some definite landmark. This can be done by means of the shadowgraph catheter, so that little if any doubt need exist in regard to the location of the shadow.

As examples of the difficulties encountered in draw-

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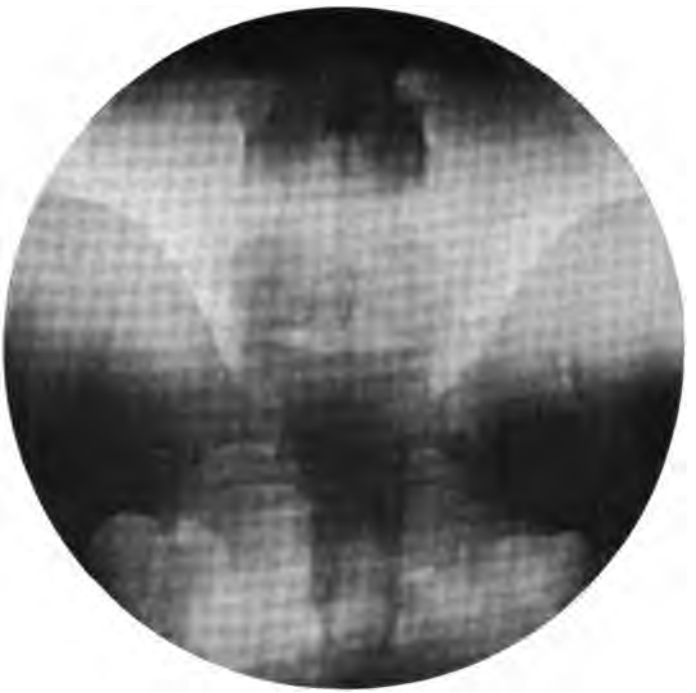

Fig. 10.

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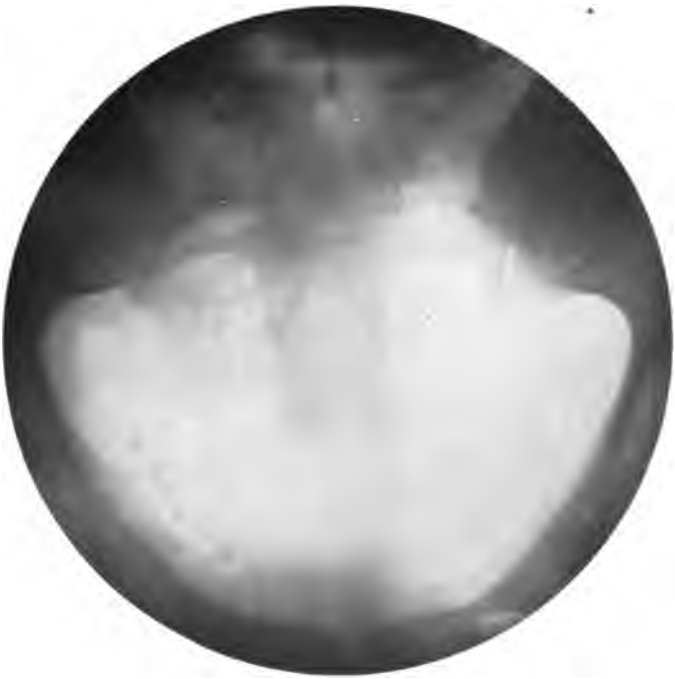

Fig. 11.

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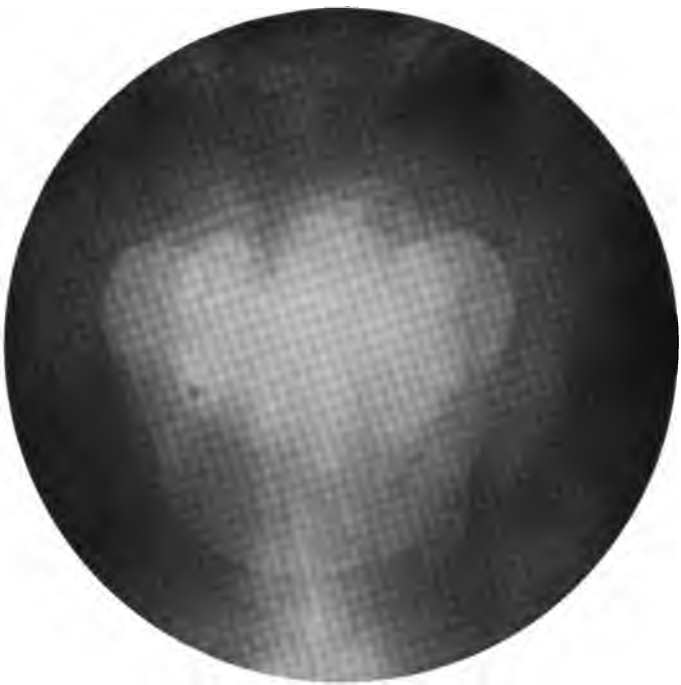

Fig. 12.

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ing conclusions from a plain skiagram, we have selected the following four cases:

Case X (Figure 10): This shows a shadow at the brim of the pelvis just beyond the sacroiliac synchrondrosis. The presence of ureteral stones in this area is quite apt to be overlooked in the skiagram, so that sometimes, although the skiagrapher's report is negative as regards the presence of a stone, a stone is removed from the ureter at the time of operation. A stone's being overlooked in this location can often be explained by the fact that the stone lies on the bone. Knowledge of this fact has led radiographers to take pictures at different angles by changing the position of the tube or of the patient.

Case XI: This shows a shadow in the pelvis. It is absolutely impossible, either by its size, shape or position, to say whether this shadow has an intra or extra-ureteral origin.

Case XII (Figure 11): This shows six or seven shadows near the spine of the ischium. It has been shown that this type of shadows, multiple and occurring in a row along the spine, have an extra-ureteral origin. Still, how much more secure one feels after a shadowgraph catheter has been passed, and one can say positively, without any hesitation, they are not ureteral calculi.

Case XIII (Figure 12): This shows shadows on both sides of the pelvis, on the left side near the ischial spine, and two on the right side between the ischial spine and the symphysis pubes.

In the following three cases the presence of these obscure shadows in the pelvis were proved to have an extra-ureteral origin by means of the shadowgraph catheter.

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Case XIV (Figure 13): Mr. N. C., age forty-three years. The patient states that for the past year his urine has contained sand. Since that time he has frequency of urination, passing water once every hour during the day and three times during the night. He has difficulty in starting the stream, and the act of urination is accompanied with a burning sensation in the urethra, which persists after the urinary act is finished. During the past year he has had several attacks of hematuria, each lasting for several days. Three days prior to entering the hospital he had several attacks of abdominal pain, localizing in the region of the left kidney.

The X-ray showed the presence of three pelvic shadows. Several days after this picture was taken the patient passed a very small calculus, which might have corresponded in size to one of the pelvic shadows. It was decided, therefore, to take a second X-ray picture with a shadowgraph catheter *in situ*. This shows shadows well outside the ureter, and hence they are not due to ureteral calculi.

Case XV (Figure 14): Mr. M. K. For several years the patient has been suffering with great frequency of urination, both day and night, often being obliged to urinate twelve to fifteen times during the day and five or six times during the night.

Cystoscopy shows a very marked degree of cystitis in the bas fond, but no stone and no tumor. X-ray examination revealed the presence of shadows in the pelvis well toward the bony wall. Because of the great urgency and frequency of urination, it was thought best to pass a shadowgraph catheter into the ureter and then obtain another X-ray. This shows the catheter passing upward toward the kidney, and outside of it the presence of the shadows are noted some distance from the catheter. It is quite appar-

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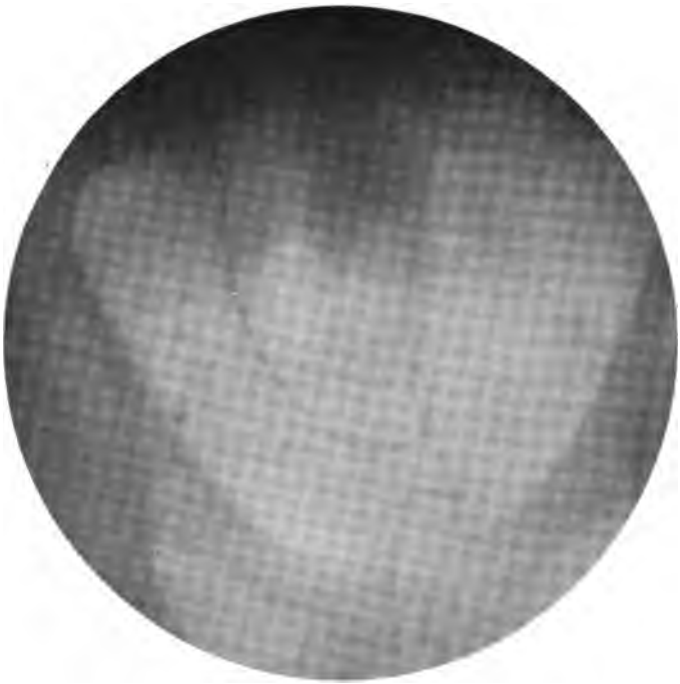

Fig. 13.

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Fig. 14.

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Fig. 15.

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ent, therefore, that we are dealing with some extra-ureteral shadow-producing bodies and not with ureteral calculi.

Case XVI (Figure 15): The shadow is quite small and lies well to the outside of the catheter, but not so far away as in the preceding pictures. When the shadows lie quite close to the catheter, but not in direct contact with it, as sometimes happens, one must always bear in mind the possibility of a stone being present in a saculation of the ureter.

Figures 13, 14 and 15 show conclusively that we are not dealing with ureteral calculi, but that the shadows seen are of extra-ureteral origin.

DISCUSSION

OF PAPERS BY DRS. PILCHER, FOWLER AND KRETSCHMER

DR. W. F. BRAASCH of Rochester, Minn.: The injected radiographs that Dr. Fowler demonstrated are indeed most interesting. Pyelography has proven to be of considerable value in demonstrating the existence of small distentions of the renal pelvis, varying from 20 to 30 c.c. capacity. While the over-distention method of Kelly will suffice to demonstrate the existence of a hydronephrosis of more than 30 c.c. capacity, it is not to be relied upon in the diagnosis of distentions below that size. I would hesitate to diagnose the existence of a kink in the ureter by an evident angulation in its course, visible when the patient is standing. Unless a distention of the pelvis and ureter can be shown above it, an evident kink is probably not causing any symptoms. While the radiograph shadow of the ureteral stylette, as demonstrated by Dr. Kretschmer, is frequently of value, it may also be misleading. As I have described in a recent paper, calcareous bodies in the ureteral wall or in close proximity to it may appear adjacent to the stylette shadow in the radiograph and give the erroneous impression that they lie within the ureter. Again, a stone in a ureteral diverticulum may

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appear to be some distance removed from the stylette and extra-ureteral. It has been my experience that the injected radiograph (collargol) is more accurate in determining whether doubtful shadow is intraureteral or not.

DR. GEORGE W. WARREN of New York: I am very much interested in these cases of hematuria. In the past two or three years I have had several cases under observation in which hemorrhage was profuse. The urine was so bloody that the blood clotted in the bottom of the glass. Decapsulation of the kidney was done, and two or three years have elapsed without recurrence of the hematuria. I had one case of supposed angioma, but the kidney could not be delivered upon the loin. The blood supply was cut off from the lower papillæ. The case reported by Dr. Fowler is, in my opinion, one of diffuse nephritis. I saw in consultation a case bleeding from the right side. Cathethers passed the normal distance on both sides. The left kidney showed, as revealed by urinalysis, very slight chronic interstitial changes. The right kidney could not be found at operation, although search was everywhere made. The wound was therefore closed. Two subsequent hemorrhages occurred, the second proving fatal. At necropsy a fused kidney was found in the bony pelvis. The right half showed the changes observed in the Weigert kidney; on the left side were found the changes of ordinary diffuse nephritis.

DR. R. L. RIGDON of San Francisco: In regard to the shadowgraph in a case recently under my care: A man presented some symptoms that made it necessary to have a radiograph taken. The plate showed small shadows in the position of the right pelvic ureter. The shadow catheter was introduced, another picture taken, and these shadows were shown exactly in line with the catheter. We were not just satisfied that the case was one of ureteral calculus, and in order to investigate further we put the shadow catheter in again, and then changed the position of the patient and took the picture from a different lateral angle. This picture showed that the stones were really situated at a considerable distance from the catheter. If they had been in exact contact with the catheter, as appeared in the second picture, they would have remained in contact when the position of the patient was changed and the third picture was taken.

DR. EDWARD L. KEYES, JR., of New York: I should like to second the remarks of Dr. Braasch; he said many things that I intended to say. I would like, however, to add one remark.

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It has not seemed to me that it matters so very much whether these cases of so-called small hydronephrosis are true hydronephrosis or not. The main point is that they shall cease to cause pain and that we shall remove the cause. That cause of pain, of course, exists in the ureteral obstruction, and therefore it has seemed to me much more important in these cases to study the ureter than to study the pelvis, that is, as to the content of the pelvis, and for that study it is particularly important not to use styletted catheters, as Dr. Braasch has said, because they are so likely to give little breaks that suggest kinks. One can distinguish very plainly the curves that a normal ureter takes as compared with the kinks in an adherent ureter. I have here two pictures, a normal case and an abnormal case, in which the ureter is adherent to the lower pole of the kidney, illustrating this point.

DR. HUGH CABOT of Boston: I should like to say a few words with regard to renal varix, a subject in which I have been very much interested. I think it is necessary to demonstrate very clearly that these cases of hemorrhage from the kidney actually have a varix. I have been shown at operations conditions of the papillæ which did not seem to me to be varix. I have seen those kidneys removed, and later there was found to be no varix. These varices are very elusive. Some of these cases may be due to other conditions. Within the last week I have had two of these cases in which splitting the kidney from ear to ear — a thing which I intensely dislike to do — entirely failed to demonstrate anything which I could see in the papillæ. They corresponded in other respects to the cases reported by Dr. Pilcher. I think there is some condition in these kidneys — not a nephritis — which causes the hemorrhage. Whether or not they are cured by section I do not know, but the mortality of section is larger than one likes to undertake, if the hemorrhage can be cured by other measures. Secondary hemorrhage occurs in some of these cases. In my cases where the hemoglobin has been low, I have always done direct transfusion after the method of Crile, and it seemed to lessen the risk. It is an unobjectionable and very valuable procedure.

In regard to the paper of Dr. Schmidt and Dr. Kretschmer, I have a feeling that it is possible to distort a ureter with a catheter, and that these apparent deviations of the ureter may be more apparent than real, that they may not be pathological, and that considerable mobility of the ureter may exist which has only come to our knowledge by the use of these new methods. I

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think with these methods we are likely to be carried away by the discovery of things we did not know, but which are not pathological. A suggestion of Dr. Braasch's interests me, and that is the injection of these ureters containing a stone with collargol. It does not seem to me a wholly innocuous procedure. I have seen considerable colic following injection, and I have heard of it on other occasions. Perhaps Dr. Braasch's technique is such that he can get that collargol out again. I hesitate to fill up a ureter containing an impacted stone with collargol.

DR. GRANVILLE MACGOWAN of Los Angeles: Three of the cases which I reported were distinct angiomatas. They were not varices, and were situated in the upper pole of the kidney. I think if you exercise care in a case of this kind the patient won't be likely to bleed to death from the operation. I have had none that died. I have sometimes had most frightful hemorrhages where I have operated for stone, and twice I recall I was obliged to take the kidney out, but in cases such as have been described here today I think if we exercise care we won't lose our patients, although very often, like Dr. Fowler's, they may be almost dead before operation. I think if this kidney had not been removed he would have found later that he was dealing with a tuberculosis of the cortex. Often the first symptom of this is a hemorrhage, which is profuse, and it then may be silent for several years. There was something about the pathological description in this case that was reminiscent of tuberculosis of the cortex.

DR. G. KOLISCHER of Chicago: Dr. MacGowan alluded to tuberculosis hematuria. Cases have been reported where patients with what was considered essential hematuria came back later with a well-developed tuberculosis of the same kidney. It is claimed that the tuberculosis developed in the papillæ of the kidney.

As to the technique of making pictures with the shadowgraph: when Dr. Schmidt and I devised and developed this method twelve years ago, we performed experiments on the cadaver and found that it was impossible to distort the ureter by the introduction of the wire. This wire is so soft that it is impossible to move the ureter in any direction. You find the same deviations of the ureter as shown in some pictures today if you inject it with collargol. If you are afraid that you will cause a renal colic by injecting collargol, do not inject it by a hand syringe, but let it run in from a fountain syringe under

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moderate pressure. If somebody objects to injecting collargol, especially in stone cases, then use oxygen. It is very simple. All you have to do is to connect the ureteral catheter with an oxygen tank and you get a beautiful X-ray picture.

DR. PILCHER: I think the criticism of one of the cases was all right, but in all the other cases there were definite lesions of the kidney. If you cut the kidney in two, naturally you let all the blood out of these venous radicals immediately. But if you remember the appearance of a varicose vein after the blood has been let out the surface is quite different, and in those cases of renal varix which I have seen the appearance of some of these papillæ was such that it led us to believe that we had a distinct pathological condition. The only one in which I was able to prove the condition was the one in which the kidney was removed, and on looking at the surface of those papillæ you would not say there was any lesion at all, but on making microscopical sections you find the dilated venous channels.

DR. FOWLER: I reported this case for the purpose of getting additional light on the possible cause of the hematuria, and I am very grateful for the suggestions which have been made. We all are familiar with the various microscopic lesions of the kidney associated with hematuria. And I am of the opinion that every case of essential hematuria, if studied intensively enough, will reveal some underlying pathological condition sufficient to explain the bleeding. In our patient there were changes in the kidney which may be considered sufficient, probably, to account for the hemorrhage, but it emphasizes this point, namely, that extremely profuse hematuria may result from lesions of the kidney which are microscopic in character. This, I think, is a very important point. I do not think there is sufficient evidence in the histological examination to justify us in putting our case in the group of chronic interstitial nephritis. I had the pleasure of reporting a case of that kind about six years ago in the "Annals of Surgery," one of the first cases, I believe, of profuse hematuria due to chronic interstitial nephritis reported in this country. The case here reported was examined very carefully and excludes, I believe, chronic interstitial nephritis as the cause of the hemorrhage. Just why the bleeding occurred I do not know.

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INTRAPERITONEAL OPERATION FOR EXTENSIVE CARCINOMA OF THE BLADDER, WITH NEW METHOD OF TREATING THE DIVIDED URETER.

PAUL M. PILCHER,
BROOKLYN, N. Y.

The following case came to our private hospital for treatment, through the courtesy of Dr. John W. Poole of Brooklyn: —

Case 140. A woman of sixty-two years of age. Family and previous history negative. Her first intimation that anything was wrong was the appearance of a small amount of blood in the urine ten months before consulting us. This means that the bladder involvement had already reached some advancement at that time. Blood continued to be passed in the urine at intervals, with some periods when no trace of blood could be found. Latterly the amount of blood in the urine has greatly increased, although it is absent at times. There was only occasional increased frequency of urination. Lost considerable weight, but still an obese, thick-set woman. No symptoms referable to either kidney.

Cystoscopy. Right ureter opening (ostium) normal. Right kidney function normal, as shown by the phenolsulphone phthalein test (twelve minutes). Left ureter opening swollen and distorted, and seen to be involved in a carcinomatous growth. The opening itself was crater like, being surrounded by a raised

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up cauliflower growth. The left ureter opening, the left wall of the bladder, a portion of the trigone, some of the anterior wall and an area extending around the urethral orifice were seen to be involved in the malignant growth.

A vaginal examination revealed a distinct hard mass occupying the vesico-vaginal septum, about two inches in length by one inch in width. It did not involve the vaginal mucous membrane. Every one will recognize the extent of the lesion which was to be dealt with.

Operation, April 21, 1911, by the writer, assisted by Dr. Lewis S. Pilcher and Dr. James T. Pilcher. Incision from umbilicus to symphesis; peritoneal cavity opened; Trendelenberg posture; pelvis emptied of intestines and protected by gauze pads; bladder widely opened in the median line and growth well exposed. Using scissors, the bladder wall which was involved was detached from the healthy bladder wall down to the urethral opening and the left ureter opening. At the point of exit of the left ureter it was found that the growth was superficial, having extended along the mucous membrane without involving the deeper structures. It had not apparently extended into the lumen of the ureter. The mucous membrane, the submucous structures and a portion of the muscular tissue surrounding and underlying the left ureter opening, including all of the tissues involved in the malignant growth, were freed and dissected up, the ureter itself not being cut across. By using traction on the flap which had been separated it was found that the ureter was loosened from its sheath within the bladder wall and could easily be pulled down through the bladder wall. In this particular case over two inches of normal ureter was drawn through the bladder wall into the interior of the bladder. The question of what should be done

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with the ureter was next to be solved. It occurred to me that a great deal of time would be saved, and danger avoided; if, instead of transplanting the ureter, the ureter should be cut across *in situ*, about an inch from its ostium, and simply be allowed to slip back into place. This was done, the lumen cut across and the end split up about one-quarter of an inch to avoid narrowing the outlet.

My theory was this: Having removed the lower inch of ureter and a portion of the interior of the bladder there would remain an interval of from one-half to three-quarters of an inch between the cut end of the ureter and the interior of the bladder. The bladder musculature having been injured, and the bladder being kept empty for three or four days, would offer very little resistence to the efflux of urine from the ureter along the avenue of least resistance, the course of the ureter through the bladder wall being changed from an oblique one to a much shorter and more direct one. My experience with uretero-vaginal, uretero-abdominal and other ureteral fistulas has taught me that if we have an unobstructed ureter, then a shell of other tissue forming a sinus, and then a surface lined with mucous membrane, and no other outlet for the urine from the ureter, the establishment of a fistula along this avenue is absolutely certain. I made use of this knowledge in the present case and intentionally formed an uretero-vesical fistula.

Uretero-vesical fistula instead of transplantation of the ureter. After all the cancerous tissue had been removed, including much of the surrounding tissues beneath the symphysis, a portion of the anterior vaginal vault and all but a section of the urethral orifice, the bladder was reconstructed. The vesico-vaginal opening was not closed and a rubber drainage tube led through it from the bladder to the vagina.

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The anterior and lateral walls were brought together first by a running Connell suture of catgut and reinforced by a running Lembert suture of catgut. The intraperitoneal portion of the bladder was closed by a separate suture and reinforced à la Mayo. The peritoneal cavity was closed without drainage. The suprapubic portion of the wound was closed, with the exception of a cigarette drain behind the symphysis. A second drain of rubber tubing was brought out beneath the symphysis and to the left of the labium majora. The bladder had in this way been entirely closed excepting at its base in the region of the trigonum, and to the left of the urethral orifice, which could not be entirely covered in, but which was satisfactorily drained by tube in the vagina. The left kidney discharged its urine via the left ureter, then through the uretero-vesical fistula into the bladder.

The patient made an uneventful recovery. There was no leakage of urine excepting through the vesico-vaginal opening. The drainage tube was removed from beneath the symphysis on the third day, from the suprapubic opening on the fourth day, the vesico-vaginal tube on the fifth day. At no time was there any symptom referable to the left kidney. She passed urine per urethram on the tenth day. The leakage per vaginam ceased about the sixteenth day. She left the hospital on the thirty-first day, completely recovered.

I appreciate that the first criticism which would be offered would be that the bladder musculature would contract and stenosis around the vesical orifice of the fistula take place. Our experience, however, in cases of prostatectomy in which a comparatively large section of urethra has been entirely removed and which is not followed by an obstructive stricture

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at the vesical outlet led me to hope that a similar phenomenon would protect the uretero-vesical opening.

The experience gained in this case led me to theorize as to the possibilities of attacking the lower end of the ureter through the bladder, not simply to remove calculi, as has been so frequently done, but in the treatment of strictures of congenital origin or any disease involving the lower end of the ureter which does not involve the peritoneum. It is essential, to my mind, that the peritoneum should be intact, for even if a relatively large portion of the ureter were removed or stripped out from its peritoneal covering, the tunnel thus left would suffice to convey the urine to the bladder and form a uretero-vesical fistula. Knowing how difficult it is, oftentimes, to cure an ureteral or a vesical fistula of accidental origin, I think we would be justified in taking the chance of the fistula remaining patent. I believe that the chances of this are just as good, and not attended by so many chances of failure as in ureteral transplantation in the hands of the majority of surgeons. In the only case of transplanted ureter which has come under my observation, post-operatively, I found that no urine was entering the bladder from the corresponding kidney.

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VESICAL PAPILLOMATA.

LEWIS WINE BREMERMAN,
CHICAGO, ILL.

A few years ago vesical papillomata were considered a rather rare condition, but at present, with our better methods of diagnosis, the urologist is coming in contact with these cases quite frequently, yet fortunately papillomata form only a small percentage of bladder affections, consisting of about three to five per cent of all genito-urinary conditions.

Tumors of the bladder are not so common as tumors elsewhere, it being estimated by various observers that vesical tumors form only from one-quarter to one-half of one per cent of all tumors, so if our statistical estimate be correct, the bladder as a seat for this pathologic condition is of more frequent occurrence than is generally conceded.

Statistics computed by various authorities show that papillomata are of much more frequent occurrence among males than in females in the proportion approximately of about three to one. It is difficult to obtain accurate data upon this subject, due to the fact that special work of the various investigators must be considered. As a rule the urologist sees more men than women. With the gynecologist the reverse is the case. In my work the male cases are in the proportion of two to one over the females. In this article I will report twelve cases, of which four were females.

The ages of the individuals suffering with this condition vary. Some cases have been reported as

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young as sixteen years and as old as seventy-five. In the cases which I will report, the youngest, a male, was twenty-four years of age, the eldest, a female, was sixty-eight, with an average of forty-five years; therefore, it may be assumed that vesical papillomata are associated almost entirely with adult life.

The direct cause of tumor of the bladder, as with tumors elsewhere, is absolutely unknown. Many theories have been advanced to account for tumors of the bladder, but they are all practically exploded. It has been considered that owing to the frequency of certain cell inclusions which have occurred in the epithelial variety of bladder tumors that certain parasitic elements were responsible to a degree, at least, for their origin, yet the weight of evidence is against such a theory, for the actual organism has never been isolated or demonstrated.

Personally I feel that the Cohnheim theory explains, at least with a reasonable degree of certainty, the theory of the development of all tumors, and, until more substantial evidence is reported, holds good in tumors of the bladder.

In all of my cases there has been a long-standing inflammatory condition of the bladder, which has persisted in some cases under careful active treatment, but in other cases a very inadequate form of treatment had been employed. As far as occupation is concerned, in my cases it need not be taken into consideration, as I am sure it plays no part as an etiologic factor, as all of my cases were individuals of the better class. I could trace no connection in any of my cases where a chemical irritation might be responsible for the condition, as so reported by some observers. Mechanical irritations of the bladder, of long standing, produced by foreign bodies, such as stone, etc., are considered by some authorities to

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bear a very definite relation to the formation of tumors; others, however, are of the opposite opinion.

In the cases here reported I have never found a distinct calculus. There have, however, been some crystalline incrustations noted, which is not at all unexpected. I have never seen a tumor in any of my stone cases, with the exception of one where there had been two suprapubic cystotomies performed, one for a stone, the other for a prostatectomy. I removed a stone some months after the prostatectomy, and there was evidence of some papillomatous tissue, which proved to be typical papilloma.

Tumors of the bladder are variously classified, but the classification of Kuster and Davis seems to be the most practical.

I. Epithelial Group: —
   (*a*) Papilloma.
   (*b*) Carcinoma.
   (*c*) Adenoma.
   (*d*) Cysts.

II. Connective Tissue Group: —
   (*a*) Sarcoma.
   (*b*) Myxoma.
   (*c*) Fibroma.
   (*d*) Angioma.

III. Muscular Group: —
   Myoma.

As this paper dwells particularly with the papillomata, I will not consider the other forms.

The papillomata are by far the most frequent in occurrence, and develop in the mucosa and submucosa. Histologically, these tumors are composed of a framework of connective tissue, with a network of fine blood vessels completely covered with epithe-

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lial layers, usually pedunculated, yet may develop over quite an area, or several may arise from a single pedicle. The network of blood vessels accounts for the frequent hematuria associated with these cases, due to a breakdown of the epithelial layers, resulting in ulceration and destruction of the surface exposing the vessels, proving that the development of the growth has progressed to a marked degree. I am of the opinion that if the diagnosis be made early, prior to the appearance of a hematuria, that there would be fewer cases of recurrence. Unfortunately the cases do not come to the urologist direct, they usually go through a long period of treatment before coming under the observation of the specialist, whose cystoscopic skill is such that an easy diagnosis may be made. The diagnosis lies entirely in the use of the cystoscope, so that the character, location, size, and the general appearance of the bladder may be thoroughly studied, and from the picture definite measures may be outlined as regards treatment.

A small portion of the growth may be procured by means of the cystoscope, and a microscopic examination made from a section, affirming or contradicting the diagnosis, together with a definite knowledge of the variety of tumor with which one must deal.

It will be the scope of this paper to discuss briefly the operative method, with the endeavor of arousing a discussion from those present who have had experience in the various methods, and for the purpose of ascertaining, if possible, which method gives the most favorable results.

It has been proven that vesical papillomata are exceedingly prone to recur, yet as a rule the recurrence is not apt to be at the site of the primary growth; it is usually outside of the previous operative field. The recurrence occasionally is evidenced in

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the operative wound. It is also shown in a large percentage of cases that the recurrence assumes the malignant type even when careful examination has shown the original tumor to have been apparently benign. No definite theory has been advanced in regard to this phenomenon. I might suggest that more thorough examinations be made of serial sections of the primary growth, and by so doing there might be some portion of the specimen which would appear to have some malignant tendencies. The fact that, as a rule, the recurrence is not in the site of the original growth causes, at least, a theory upon the subject, in that the undue trauma of the vesical mucosa and submucosa, particularly so in cystotomies, sets into activity cells which otherwise might not be stimulated into proliferation and the formation of a new growth.

The symptomatology and diagnosis is so classic that I will not go into a prolonged discussion. I would say, however, that in all cases of long-standing, persistent, painful and frequent micturition, a cystoscopic examination should be recommended, as early diagnosis here, as elsewhere in the body, is essential.

Hematuria is recognized as the cardinal symptom of vesical papillomata; this is true, but it proves that the growth has advanced to a marked degree. I am of the opinion that, if the diagnosis be made early, before the presence of marked hematuria, there would be fewer cases of recurrence.

It is the concensus of opinion that a radical operative procedure is the only method of treatment. The methods most commonly employed are cystotomy, by the suprapubic route, extra-peritoneally or transperitoneally, operative treatment intravesically, as first outlined by Nitze and advanced by others, and, last but not least, the fulguration method as first

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applied to papillomata by Beers and advanced by Keyes and others.

My cases are grouped into two classes, seven of which were operated upon by the suprapubic extraperitoneal route, of whom the youngest was thirty-seven and the eldest sixty-five. Of this seven, five are dead, one still living and in good health, one not located. There were two females and five males. The females were of the ages of forty-seven and forty-eight respectively, both of whom died, one aged forty-seven, eight months and two weeks after operation with recurrent malignant type, on whom a necropsy was denied. I was fortunate to obtain a cystoscopic picture three days prior to death; this, however, was blamed for the demise of the patient. In the second case I obtained a necropsy; the result will be tabulated under the report of her case individually. Five cases were treated by the fulguration method; in these cases there have been no deaths or recurrences as yet.

Case No. 1. Female, aged forty-eight years, married, three children. Previous history, negative. Family history, a sister died of carcinoma of the stomach. Patient complained of more or less urinary trouble since the birth of her last child, a period of twelve years. She had treatment from time to time, but without result; finally she began to have pain in the right lumbar region. Various diagnoses were made, all pointing toward the kidney as the seat of the trouble. She finally came under my observation. Cystoscopic picture showed pedunculated papillomata immediately above the right ureteric orifice. I reported this case at the meeting of this association in 1909, showing hydronephrosis due to occlusion of the ureter by the growth. No hematuria in this case. The growth was removed by supra-

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pubic cystotomy, and recovery was uninterrupted. She was entirely free from symptoms for slightly over six months. When visiting in the East she had a sudden hematuria, which was very persistent and accompanied with painful and frequent micturition. She was treated for nearly one month and was brought home, the bleeding never having stopped completely. She refused all operative measures, even refusing a cystoscopic examination at this time. She could be kept free from pain only with morphine. She became very emaciated and weak, and died eight months and two weeks following operation. I managed to obtain a cystoscopic view of the bladder three days prior to her death. Necropsy refused. Cystoscopic picture showed the entire floor and part of the left wall of the bladder to be involved. The interesting feature in this case was that the recurrence was located some distance from the original seat of the papillomata.

Case No. 2. Female, aged forty-seven years, widow, two children. Previous history, negative. Family history, negative. Case referred to me by the late Dr. Tope. Patient had complained for years of urinary disturbances. When I was called in the case she had had a sudden active hemorrhage. Cystoscopic examination showed a large mass of soft, cauliflower-like growth. There were apparently no pedicles. The tumor looked as though it extended over a considerable part of the bladder, and seemed to take its origin from the right side of the bladder near the right ureteric orifice. A suprapubic cystotomy was done; the mass was so soft that it was removed in pieces. It arose from a large pedicle, there were several smaller masses arising from smaller pedicles. The bases of the pedicles were cauterized by the actual cautery. Section of the tumor showed typical papilloma. The suprapubic wound never

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healed. She left the hospital, returned to her home. She was somewhat improved, but the urine escaped through the fistula when she attempted to urinate. In five weeks the symptoms became exaggerated, she was greatly annoyed by frequent and painful urinations, the urine contained pus and blood, the latter, however, only in microscopical amounts. The patient died four months later with carcinoma, involving the bladder, which was adherent to the rectum and uterus, and the fundus of the bladder showed carcinomatous tissue even on its external surface. There were areas of carcinomatous material in the liver, kidneys, stomach and uterus. In this case my clinical diagnosis was primary carcinoma of the bladder, but the microscope primarily showed the tumor to be papilloma.

Case No. 3. Mr. P., age sixty-five years, married, one child. Case referred to me by the late Dr. Tope, Oak Park. Previous history, negative. Family history, negative. Patient had been treated for a cystitis for about one year. Had a marked hematuria when he consulted Dr. Tope. Cystoscopic examination was done with considerable difficulty, as the bladder was distended with clots. These were finally washed out, and a papilloma about the size of the last joint of the thumb was seen. It was bifurcated, but attached to one pedicle. The bleeding was coming from one of the roots of the bifurcation. The patient was informed as to his condition, and told that an operation was necessary. He remained in the hospital for a day or two, the bleeding stopped as suddenly as it started; he then refused operation. He still had symptoms of a cystitis and the bleeding was the only thing that bothered him. Two months later he began to have more hemorrhages. He came at once to see me and consented to an operation.

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A suprapubic cystotomy was done, the tumor wound cauterized, the bladder drained. Four weeks later he left the hospital, as far as symptoms were concerned, a well man. The operation was done in the early part of September, 1909; on December 25 he called to see me, he had been having a return of his symptoms, frequency with tenesmus, urine showed pus and blood, had considerable pain in the region of the abdominal wound, with some tenderness upon pressure. His condition became worse, action of the heart and kidney greatly impaired. Had difficulty upon evacuation of the bowels. By rectal examination a mass was felt, apparently involving the prostate, bladder and rectum. On January 1 the old operative wound began to ulcerate, and foul-smelling urine, blood and pus began to escape. On the twenty-fourth of January the patient died. Pain was controlled by morphine. Necropsy refused. Clinical diagnosis: malignant recurrence of the primary papilloma.

Case No. 4. Mr. W., age forty-five years, married, no children. Previous history, never had syphilis, but had had several attacks of gonorrhea, the last one at the age of thirty-two years; this was of long duration. Patient had a prostatic abscess and a right-sided epididymitis, apparently made a perfect recovery. Four years prior to my seeing the case the patient had an external urethrotomy for stricture, perfect recovery. About three months before I saw him he began to have frequent, painful micturition, with occasionally a little blood. He believed that all of his symptoms were due to the stricture. He had had some instrumentation for relief of his stricture. When I first saw the patient he had an acute retention. His urethra had been severely traumatized with the endeavor to empty the bladder. It was

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absolutely impossible to get even a filiform past the obstruction. I decided to perform an external urethrotomy at once without a guide. I have never in my experience met with a more difficult case. The normal anatomical relations were all destroyed and I was unable to enter the urethra. To accomplish results I decided to do a suprapubic cystotomy for the purpose of a retrograde catheterism. I already had a sound in the urethra to the point of obstruction. The bladder was opened, and much to my surprise I found a pedunculated growth about the size of an almond. Retrograde catheterism was accomplished, the urethra between the ends of the instrument and the stricture cut. I had hoped to do a resection, but there was too much fibrous tissue present. The papilloma was removed, the base cauterized, drain put in above and below. The patient made a slow recovery. The examination of section of the growth showed papilloma. Patient left the hospital four weeks after the operation. The urethra would take a No. 28 sound easily. Five months after the patient left the hospital I was called in by his wife to see him and found him in a foul-smelling basement with no comforts whatsoever. He was having a return of his old trouble, bleeding more severe than ever, patient very thin and emaciated, had been having symptoms for about one month.

Examination: Prostate enlarged, hard and nodular. Cystoscopic picture showed an enlarged thick mass which was bleeding, the examination was very painful. I performed a suprapubic cystotomy and inserted a drainage tube for the relief of the exceedingly painful and frequent micturition. Exposing the bladder I confirmed my cystoscopic diagnosis of carcinoma of the prostate, involving a good portion of the bladder. The patient gained a little for a

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few days, after which he began to fail. He left the hospital again and went home, but never left his bed. Three months after the second operation the patient died. I was unable to obtain a necropsy. I neglected to state that a small piece of the growth removed from the bladder wall in two places proved to have the structure of a carcinoma. The growth was so extensive that I was unable to say whether or not there was any carcinomatous tissue at the site of the removal of the primary tumor.

Case No. 5. Male, age forty-eight years; married. Previous history, negative. Family history, negative. Urinary trouble began two years prior to my seeing him, he having frequent and painful micturition. He was treated for a cystitis for a long time, with some improvement, but the condition would recur just as soon as active treatment was discontinued. He was sent to me by his physician for a cystoscopic examination. Patient had never seen blood in his urine, and denied all venereal history. Cystoscopy showed an extensive papillomatous condition, soft, and waved back and forth easily in the fluid in the bladder. Growth seemed to extend all over the posterior wall of the bladder. Operation was suggested. One week later suprapubic cystotomy was done, tumor removed, base extensive, feared malignancy at this time. Report from the laboratory gave papilloma with suspicion of malignancy. Patient left the hospital four weeks later, wound still leaking a little urine. I lost sight of him, but have learned that he died eighteen months after the operation; report from the doctor in attendance at the time corroborated my opinion of carcinoma.

Case No. 6. Male, age, forty-six years; married. Previous history: had an attack or two of gonorrhea

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in early life. Had syphilis in 1900. Took active treatment for three years; had had no symptoms since of this condition, apparently recovered. I saw this patient first fourteen months ago in July, 1910, when he presented himself to me. He stated that he had been under treatment for three months for a gonorrhœa. His discharge had disappeared, but he had frequent and painful micturition, both by day and night, some pain in back, and there was pus in the urine.

Examination: All of the urine passed contained pus. Prostate slightly soft but of normal size, not sensitive. Began to suspect pyelitis, so cystoscope was passed into the bladder. Mucosa exceedingly red, and bladder very irritable. Much to my surprise I found two small, pedunculated growths, situated almost together, just beneath and on the inner side of the right ureteric orifice. Catheterized specimen from the kidney showed normal urine. Suprapubic cystotomy was done, tumors removed, bases cauterized, bladder drained. Patient made an uninterrupted recovery, symptoms disappearing. Have seen him three times during the last year. Cystoscopic examination shows normal bladder. Last examination one month ago showed no evidence of recurrence. Patient in good health. Promised to come into town for a demonstration at this meeting and I hope to be able to show him.

Case No. 7. Male, forty-five years; married. Previous history, no syphilis, two attacks of gonorrhœa as a young man. Family history: mother died of carcinoma; one brother died of carcinoma; father died of pneumonia; otherwise negative. Trouble began with the patient getting up once or twice at night to pass urine. This began the latter part of the year 1909. He consulted his physician

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who examined him and told him that his condition was enlargement of the prostate. The frequency continued, he consulted several physicians, and all of them recommended prostatectomy. The frequency became worse, he began to have pus in the urine, and micturition began to grow painful. He consulted me in December, 1910.

Examination: Prostate slightly enlarged, painful. Cystoscopic examination showed no obstruction to the flow of urine, but on the floor of the bladder there was a tumor about the size of a walnut which seemed to have no pedicle. It had a cauliflower-like appearance. He was told of his condition. A suprapubic cystotomy was done, the tumor removed,—in fact, it shelled out very easily,—base cauterized, hemorrhage profuse, necessary to pack the bladder to control it. Patient made an uninterrupted recovery, left the hospital in exactly three weeks to a day. He was instructed to keep himself under observation, but I have not seen him since and cannot locate him.

Case No. 8. Edward S., age, twenty-four years. Sent to me by Dr. Peter S. Clark. Previous history: Had an attack of gonorrhœa at the age of twenty-one, lasting six months. Since then has had no similar trouble. Family history, negative. Patient complained of difficulty in passing urine, this had lasted for some time, but he gave the matter no attention until he arose one morning and noticed that his urine was full of blood. Dr. Clark was called, and the case was immediately sent to me. Patient presented himself last May.

Examination: All of the urine was full of blood which appeared at every urination. Stricture 20 F. at the bulb. Small cystoscope was passed, and I found the cause of the bleeding to be a tumor, single,

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pedunculated and ulcerated, taking its origin from the floor of the bladder just internal to the urethral opening. I have never before seen a tumor at this point. Patient complained of much pain following the emptying of the bladder. I suggested the use of the high-frequency current, but owing to the stricture was unable to enter the bladder with my cystoscope. I dilated the stricture gradually, and in about ten days or two weeks managed to get the proper cystoscope into the bladder. Electrode was carried down into the mass and the current turned on. Owing to the stretching of the urethra the patient complained of considerable pain. This treatment was given for a few seconds. The bleeding stopped absolutely after the first treatment. Five days after he was given another treatment; four other treatments at five days' intervals were given. Tumor entirely disappeared. Saw the patient four weeks prior to his going on his vacation, bladder absolutely normal, three months have elapsed since my last treatment.

Case No. 9. Male, age thirty-nine years, single. Previous history, negative. Family history, negative. The patient had had two attacks of gonorrhœa in early life, one and one-half years apart, no complications. Has had no trouble of a urinary character until present trouble began.

Upon presenting himself to me the patient complained of frequent, painful urination, showed me a laboratory report of examination of urine, made by a laboratory that makes a practice of urinary analyses for a certain amount per year, making monthly examinations if the patient so desires. Report showed large quantities of pus. My own examination showed quantities of pus, with an occasional blood cell. Cystoscopic examination showed a very

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small pedunculated growth, with the evidence of a marked infection of the mucosa. This patient was first seen in August, 1910. Had just seen Keyes's report at this time and tried the fulguration method. The treatment was given at intervals of five days; this brought about a complete disappearance of the growth. I have examined him frequently since and there has been no return of the growth.

Case No. 10. Mrs. C., age, thirty-eight years; married. No children. (Referred by Dr. Steele.) Family history, negative. Previous history, urinary symptoms of long standing. Sent into the hospital by Dr. Steele, with the diagnosis of possible right-sided ureteral stone. Case was turned over to me. Owing to an exceedingly sensitive urethra and bladder it was absolutely impossible to pass a cystoscope. She was given a general anesthetic. I discovered a small papillomatous mass in the region of the right ureteric orifice. While under the anesthetic I applied the high frequency spark and used it for about five minutes. She was put to bed, with directions to have the bladder irrigated daily. One week later treated her again by the fulguration method. At this time the growth had practically disappeared. She was sent home, with directions to see me at my office daily for bladder lavage. Her last treatment was given ten days ago. At her last cystoscopic examination a week ago there was no return of the growth, and the bladder in a normal condition. She was discharged cured, but was told to report once a month for a period of one year for observation.

Case No. 11. Mrs. M., age, sixty-eight years; widow, several children. Referred by Dr. Steele. Family history, negative. Previous history, negative, except had urinary trouble since the birth of her last

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child, many years ago. Consulted Dr. Steele because of frequency and painful urination with the presence of considerable blood. I cystoscoped her and found a small papillomatous growth on the floor of the bladder. There was considerable induration and thickening felt per vaginam. Fulguration was recommended. After the first treatment patient had no more bleeding. First saw her August 10, 1911. She was given four treatments, after which examination showed no evidences of the growth, but considerable cystitis. She is still under treatment, but improving rapidly. I have seen her within the last few days.

Case No. 12. Male, age, thirty-four years; single. Referred to me by Dr. Harsha. This is an exceedingly interesting case. Family history negative. Previous history, had gonorrhœa once or twice fourteen years ago. Nothing else. For about four months prior to two years ago patient began to have urinary disturbances, frequency of urination with pain. Consulted physician, who treated him by lavage and internal medication, with no improvement; in fact, blood was soon noticed in his urine. Dr. Harsha was consulted, and two years ago, in October, the patient was operated upon. The growth was removed through a suprapubic cystotomy. Left the hospital in a few weeks. Apparently well for several months. One year ago saw the patient with Dr. Harsha. Cystoscopy showed the largest growth I have ever seen in the bladder. Dr. Harsha performed another suprapubic operation and scraped out a handful of soft material.

I might say that the laboratory report in both instances showed papilloma. The patient left the hospital apparently cured. Five months ago he consulted me. Cystoscopy showed an extensive recurrence covering a large area of the bladder, looked typically papillomatous. Fulguration was instituted. He has

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been given a treatment every five days since, with a marked disappearance of the growth, although he still has a fair supply, as some of the gentlemen here present can vouch for, as I showed this case at my clinic on Monday evening.

I feel that I will clear up the condition with this line of treatment.

My conclusion, based upon these cases, is as follows: That papillomata should be considered malignant in all cases; that in all cases of long-standing cystitis, which has persisted even in the presence of careful treatment, or with the history of frequent relapses, papilloma should be suspected, and diagnosis confirmed or contradicted by cystoscopy; that the open operation is followed rapidly in the majority of cases by an early recurrence; that the fulguration method is followed by remarkable results, but as yet no sufficient time has elapsed for us to make a definite statement as to an absolute guarantee that this treatment will prevent recurrences.

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DISCUSSION

OF PAPERS OF DRS. PILCHER AND BREMERMAN.

DR. GUY L. HUNNER of Baltimore; I do not quite understand why Dr. Pilcher expected us to criticise him severely for this operation. It seems to me that we can only congratulate him very warmly for the excellent result which he obtained, and the very neat way in which he got out of a difficult situation. My experience with these malignant tumors of the bladder is not extensive, but it has been such that I feel that any method by which you can operate and get out gracefully is a very good method to follow. I have had the experience of outlining very nicely from the cystoscopic picture exactly what I was going to do, but have never been able to follow that out after getting into the bladder. I think this is a very excellent suggestion that Dr. Pilcher accidentally discovered, the stripping of the ureter out of its sheath, and, as he suggests, this may prove very helpful in the future in dealing with certain strictures that are so obstinate and difficult to deal with, especially if they lie close to the bladder wall. We have all had experience, I am sure, in the stripping of the ureter out of its sheath in tuberculous cases where we have been operating extra-peritoneally, and have been forced to strip the ureter bodily out of its sheath, in order not to tear into the peritoneal cavity. Of course, in a case of this sort described by Dr. Pilcher, the stripping is probably done more easily because there is no inflammatory condition between the body of the ureter and its sheath.

I would like to ask Dr. Pilcher if it would not be a good plan if he had another identical case to make his vesico-vaginal opening in the healthy part of the bladder, as near the right orifice as he could conveniently, thereby giving himself a good deal more plastic tissue from the posterior wall of the bladder, so that he could bring the vertex tissues and posterior tissues together around the left ureteral opening and close the entire region of the operation. He was very lucky here, I think, to have this vesico-vaginal fistula close.

DR. PILCHER: I neglected to say that it reopened after she went home, two months afterwards; with the contraction of the urethral opening the vesico-vaginal fistula opened and she has that now.

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DR. HUNNER. That is going to be very difficult to close with its proximity to the ureter. We all know that the advance of this new epithelium is very rapid, and it is rather surprising that he got any primary closure there at all, because the ureter epithelium runs over so quickly and joins with the vaginal epithelium that we rarely get a primary closure if a fistula has been left so near the ureter. It seems to me that it might be better in a similar case to make a very generous opening at a distance from the operation field, and then this opening could be closed later, easier than an opening in the corner so near the ureteral opening and the pubic bone.

Dr. Bremerman spoke of the importance of all cases complaining of persistent and painful bloody micturition being referred to the specialist. I wish that we, as a society, could get before the general practitioner in the state meetings and the county meetings and urge that they not wait for the painful bloody micturition, but refer any bloody micturition to the specialist to examine in order to find out where it arises. We, as gynecologists, have gradually impressed the general practitioner so that we see our cases of cervical bleeding or of irregular vaginal bleeding much more early than we used to, and we are able to do much more for carcinoma of the uterus on that account. I am not so sure that it is not the public itself that we have educated more than the general practitioner. They now often go straight to the specialist rather than be delayed in the treatment by the general practitioner.

DR. BRANSFORD LEWIS of St. Louis: We can all admire the ingenuity and the exceeding skill that are required when one meets with a difficult case such as Dr. Pilcher has related, but I do not believe we are ever going to make any definite, material step in advance until we make it in a different direction — that is, receiving and diagnosing the cases at a time when something can be done without resorting to such refined work. I believe that is going to be the step that will have to be made before we can lift ourselves out of this very difficult position in which we find ourselves — not by our own fault, but because of habitual postponement of the investigation of such cases. I had the experience last year of attending a number of medical conventions in the South and West and East, in which there seemed to be a campaign of education going on among the surgeons, demanding the removal of tumors of the breast, whether they are or are not at the time cancers, on the theory that ninety per cent will be cancerous if they are not already so; and it seems

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to me that we should promote a similar campaign on this subject. While I do not do that kind of surgery, nevertheless I am glad to know the facts about mammary cancer, as I may have occasion to urge prompt consultation with a surgeon able to cope with that condition instead of having women wait around, using massage or other temporizing measures until too late for permanent relief.

I recall two cases that illustrate the efficacy of early recognition and operation. One, a man who about four or five years ago was sixty-eight years old, and who had had carcinoma of the tongue; three different times cancer of the tongue developed and had been excised by three different surgeons, after which there was no recurrence in the tongue. He was like the Irishman who had had his trousers cut off three times and still they were too short. Then this old man got hematuria. He had learned the lesson of prompt action, and without waiting he came and had that hematuria investigated, and there was a small tumor in the bladder which I found easily with the cystoscope. I went in suprapubically and took it out and cut out the base itself and he made a good recovery. That is about four years ago, and he has had no recurrence in the tongue or in the bladder. The bladder tumor was epithelioma, the same as that in the tongue.

I have recently had the opportunity of looking into the bladder of a young man and found no recurrence of a papilloma that I removed in a similar way three years ago.

Now I say that the keynote of the situation is *early attack*, both in the way of diagnosis and of treatment, rather than temporizing measures, and that idea ought to be hammered as hard as we can hammer it. As urologists that is our primary duty, and these refinements of operative technique are of secondary importance.

DR. J. BENTLEY SQUIER of New York: I wish to go on record that I have had one case of papilloma of the bladder which recurred three months after presumably total removal by fulguration. It was about one inch in one diameter and a quarter of an inch in the other.

DR. ERNEST G. MARK of Kansas City: We all recognize that there are two diseases of papillomatosis — in other words, we recognize in the bladder a cancerous condition with papillomatous outcroppings or splashes, and we recognize besides a general papillomatosis, and I would like to ask Dr. Bremerman what has

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been his experience and findings as to the etiology of that. Occasionally we find small papillomata springing from near the orifice of the ureter. In these cases the kidney symptoms, pain, etc., have been ascribed by Fenwick and others to the presence of the papillomata themselves, which cause back pressure. We have all seen cases where it was practically impossible to believe that these little papillomatous splashings could have caused the back pressure effects, and yet on catheterizing these ureters we find an ascending infection, usually of colon origin, and I would like to ask him what has been his experience in regard to this.

DR. JOHN A. HAWKINS of Pittsburgh: The paper of Dr. Pilcher is instructive in one way in particular, I think. We usually leave our patients to die of cancer of the bladder, pronounce them incurable, and let them die without any interference whatever. Here is a case of a manifest malignant tumor that the doctor has had the nerve to go after. The patient is still living, and consequently he has accomplished something, and I think, if nothing else, it teaches us that we should approach these tumors with the knife and do something with them. Recently I had the mortification of having a nice old lady die, from my own lethargy.

My own experience with papilloma of the bladder had been that my patients complained first of blood before any pain or anything else. I have examined a number of patients in a routine way and found papilloma of the bladder without any symptoms except hematuria. In one instance in a woman there were no symptoms whatsoever. In one case a man had a mucous discharge. I used the oblique illuminating cystoscope, passed through the deep urethra, examined the verumontanum, and went on into the bladder and found quite a large papilloma. There were no symptoms whatsoever, and no bleeding. I have tried fulguration quite a number of times, and my assistant has had more success with it than I have.

DR. EDWARD L. KEYES, JR., of New York: I wish to discuss only Dr. Bremmerman's paper. I have had the opportunity of treating, I think, a dozen cases by the so-called fulguration method. In these dozen cases there were sixteen or eighteen papillomata, some of them being multiple. I have probably cured two in one burning, three or four in two burnings, and from that they have run onto ten or twelve burnings, which has been the longest period required. With the better source of elec-

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tricity that I have now and the greater experience, I think I can cut down the number of burnings necessary for a cure.

The question that always arises in the mind of a man who has not tried this method is, "How great is the inconvenience?" The inconvenience is the inconvenience of repeated cystoscopy. There is also the inconvenience of having to keep your patient with you for some time. I have given the burns at an interval of one or two weeks. Most of the patients residing in my own town, there was no hurry.

At the end of about five days to one week you can see clearly enough the demarcation of that part of the tumor which you have already burned, and thereby get an idea of where to burn the remainder of the tumor. On the other hand, if you wait two weeks, some at least, and perhaps all, of the slough of the preceding burn is likely to have fallen off, and you have the tumor before you to proceed with the burning.

A difficulty which Dr. Bremerman did not mention, and which I think is most important, has occurred in my experience and in that of several other men. If you burn a simple papilloma a little too enthusiastically, at the next cystoscopy you find, not only that some of the tumor has been destroyed, but that there is a thickening around the base. Perhaps you burn the tumor again. If so, the next time you examine the patient the thickening has greatly increased. There is obviously an indurated area around the base of the tumor. It is all hardened and thickened, and if you have burned off a good deal there is an ulceration in the middle. You feel you have made a mistake, that this is a carcinoma; it is getting worse in spite of the treatment, and a suprapubic operation should be done at once if the patient's life is to be saved. Happily no man has quite had the nerve to draw that logical conclusion. Every one of us has waited, and after waiting for two or three weeks you look in again and your carcinoma has disappeared.

As to relapses: In my first case I thought I had seen a papilloma; did a suprapubic section, got a diagnosis of carcinoma from the pathologist, foresaw the return of this, and that was what started me on this treatment. I cystoscoped, found it had come back, burned it away, and the tumor has remained away one year. This patient is the only one that I have seen develop new tumors at a spot which had not been fulgurated.

Another case has had three tumors relapse nine months after I had removed two of the three by one burning and the third one by a number of burnings.

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The longest time that I have observed any case remain well is eighteen months. Two others remained well one year. I think our results with this treatment will be far better than with the suprapubic, and the virtue of it is that anybody who can handle a ureter catheter cystoscope can handle this method perfectly well.

DR. SQUIER: I did not mean to be understood as depreciating fulguration in any way, because it seems to be of the greatest value. In this particular instance in a woman seventy years of age it would have been almost foolish to undertake any major operation. The diagnosis of papilloma was made in Boston and New York, and I am quite sure it was correct.

DR. WILLIAM E. LOWER of Cleveland: I am very much interested in these papers on tumors of the bladder, many of which we all know are difficult indeed to treat. The present tendency is to burn them intravesically. The report so far has been very promising, and it remains to be seen what the after result will be. I am inclined to think that some of the bad results obtained from the suprapubic route have been largely due to technique. I believe that all tumors of the bladder should be excised when possible instead of cut off, the base burned, and the bladder drained. My method has been to open the bladder suprapubically, and, if necessary, the peritoneum, so that a good exposure of the growth is obtained. The growth is then excised by making an elliptical incision, cutting through the mucosa and musculature deep enough to completely remove the growth. The vessels are caught and tied and the cut edges approximated with a 00 chromic catgut suture. The bladder is closed by a technique which I have described in a previous publication, and no drain whatsoever introduced into the bladder suprapubically. If there is oozing, a catheter is inserted through the urethra. It is quite an exceptional case to have any leakage and the patients recover rapidly from this operation. By giving gas and oxygen anesthesia these cases do not object to coming back for a second operation, if there should be a recurrence. We all know it is rather bad surgery to treat any kind of a tumor palliatively. I would like to inquire of Dr. Bremerman whether there have been metastases in any of these cases.

DR. JAMES A. GARDNER of Buffalo: I want to report five cases of papillomata treated by fulguration. Through the kindness of Dr. Keyes last January I saw him treat a number of cases,

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and I had three cases that I had operated on which returned, and I cleaned up these three and two others, four of which have been seen at intervals of about a month since. One of them is down in Pennsylvania, and I have heard from him and he is free from any symptoms.

What I wish to speak particularly about is the ease with which this is done and the lack of discomfort. One of these patients, an old lady of sixty-nine, upon whom it would have been a pretty serious matter to operate, told me that she did not like to go to a dentist, but that she had just as soon come for one of these treatments as to go to a dentist. Her tumor was removed by three burnings. It was about as large as the first joint of one's thumb. I tell these patients after discharging them that if there is any return it will be very easy to do it again. It is so much more simple than any of the old methods.

DR. R. L. RIGDON of San Francisco: If you introduce into the bladder a galvano-cautery through an operating cystoscope and cauterize a tumor, what are the essential differences in the tissue changes thus produced by means of fulguration? As a matter of fact are they not the same?

DR. G. K. SWINBURNE of New York: My experience with fulguration is very small at present, but I have had one dispensary case, an old man, fully seventy, who never would have submitted to an operation, and who had a very dirty urine when he came to the dispensary, and this papilloma was discovered in the base of the bladder, and he has had about four applications, because the first two or three were done when my technique was not particularly good, but the later applications were made with perfect ease. That man comes to my office and submits and goes away. His urine has completely cleared, the hematuria stopped at once. What struck me particularly in this case was the fact that the urine cleared and the comfort he has enjoyed since the treatment began.

DR. GRANVILLE MACGOWAN of Los Angeles: I think these bladder tumors resolve themselves into three groups, those we can remove, those we cannot remove, and those we think we can remove and take a chance at it and perhaps do not succeed. I have tried all these methods of removing bladder tumors, and have been successful with all of them, except that of fulguration, and perhaps the reason I have not been successful with fulguration is that the cases are still under treatment. I have had

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considerable experience with fulguration in the treatment of other diseases, in diseases of the skin, and it is in certain selected cases an extremely useful method of getting rid of small growths upon the skin, and small tuberculous lesions of the skin.

I have used in the bladder the galvano-cautery for the removal of growths through an operating cystoscope three times successfully. These growths were small, the scars left afterwards were perfectly white, thin, flexible, and non-deformative. The virtue of this is shown particularly in a case that Dr. Marks reminded me of. About three years ago a man came to me complaining of symptoms of stone in the ureter. He had attacks of renal colic. The presumption, of course, was that he was suffering from stone in the ureter. He had blood and pus in the urine, and Dietl's crises at intervals. Upon cystoscoping him I found that he had a tiny papilloma situated three or four millimeters from the entrance of the ureter. When the catheter was passed up through the ureter there was nothing abnormal in the pelvis of the kidney, and the urine obtained from the kidney was perfect in its makeup. I naturally concluded that at intervals, due to congestion or something else, this tumor obstructed the flow of urine down the ureter, and that its removal would be followed by a cure of the symptoms from which he suffered. It was removed with great ease through a Bransford Lewis cystoscope with the galvano-cautery. You could approach it, burn it accurately and perfectly and with the greatest ease. I burned it only once. Ten days after the burning I cystoscoped him and found a little red mark there. Thirty days after the burning I cystoscoped him and found a perfectly white scar. You cannot improve on that. A week before I came here from Los Angeles I cystoscoped him, and he has no recurrence anywhere in the neighborhood, and he has never had any symptoms of any kind from that tumor since.

Fulguration, it seems to me, is more like, not the galvano-cautery, but electrolysis. It seems more electrolytic in action than the galvano-cautery, but the scars left are perfectly smooth, and have no tendency to the formation of keloids.

Like Dr. Lower, when I have to deal with a tumor of the bladder which is not small, which is not distinctly pedunculated, and which I am not certain can be reached by the fulguration or the cautery, I prefer to open the bladder suprapubically, either opening the peritoneal cavity, or making a cut across the abdomen and through the fascia of both recti muscles, a method described by Howard Kelly recently, but used by a number of people in different parts of the world, I think, before his description, but

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one he enjoys the distinction of first having published. In either of these conditions, and with the use of a good, strong light in your operating room, or with the use of the cystoscope of the Lewis female pattern, you can find your tumor, you can circumscribe it, and I prefer to take it out with an electro-cautery knife, making exactly the same kind of an incision that you would make with a knife, and bringing the sides of the wound together, as Lower does, except that I prefer iodized catgut instead of chromic catgut, because the latter takes a long time to absorb and might form the nucleus of a stone, to trouble us later.

DR. PILCHER: Just a word as to the suggestion of Dr. Hunner that we make a separate opening. It would be ideal, of course, and is the logical thing to do, but in this particular case, after so much tissue had been removed the idea of making a more direct opening into the vagina could not be entertained. It was a long and difficult operation, and I hesitated to do anything except to close up, provide for drainage and get the woman back to bed. I appreciate the importance of bringing some mucous membrane as a bridge around the ureter opening.

DR. BREMERMAN: I wish to thank the gentlemen for their very courteous handling of my paper and the excellent discussion.

I have a case under treatment now that has a marked colon infection. Whether the colon bacillus has any bearing upon the etiological factors in the formation of papilloma, I cannot answer.

In relation to the various forms of treatment, I think it has been the consensus of opinion that the fulguration method is the coming method for the treatment of these conditions. The doctor states that the suprapubic procedure, even under gas and oxygen anesthesia, is practically as simple a procedure as cystoscopy. I cannot agree with him. This fulguration treatment is employed without the slightest pain which is due to the electrode itself, unless you get the spark onto healthy mucosa, when you do get pain, as was demonstrated in my case Monday night; when we got down close to the edge of the tumor onto normal mucosa the patient complained of pain. This patient has been treated numerous times, at intervals of five days, and he is rapidly getting well. I think it will be necessary to give colon vaccines to clear up his infection.

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There is one thing I have noticed in my final examinations in those cases where the papillomata have been absolutely destroyed, and that is with the fulguration method there is absolutely no scar left. With these other methods, as Dr. MacGowan has stated, there seems to be scar formation following the cauterization. I have had no experience in the treatment of these by the actual cautery through the operative cystoscope. Whether or not my operative technique in the five cases that died was the best, I cannot say, but I did the best that I knew how, removing the tumor as well as I could and cauterizing the base in each case. As each of these cases had an accompanying cystitis, I thought it was better to drain the bladder for a definite period. In one case that I managed to get a post-mortem on there was apparently a rather extensive metastasis, involving the uterus, liver, rectum and stomach. The other cases, those that I could not obtain a post-mortem upon, from the general character of the patient, it was evident that there was some general metastasis.

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SUPRAPUBIC OR PERINEAL PROSTATECTOMY.

A. C. STOKES,
OMAHA, NEB.

The purpose of this paper is to arouse an expression of opinion from the members of this association, and the most common method in use by them for the removal of the prostate gland, and the arguments for the same, *i.e.*, whether suprapubic or perineal, and by what methods in either case is the chosen procedure.

You are all familiar with the ordinary arguments for and against both methods. There are, however, a few of these arguments that I wish to review. I desire to do so with an entirely open mind, if such a thing is possible. Personally, I have done about an equal number of operations both ways. Using first the Goodfellow method and then the Albarran-Young method for the perineum and for the suprapubic route the Belfield–Freyer procedure, with some modifications.

(1) The Goodfellow method we entirely abandoned because we could not see, and in eleven operations performed in this manner I was not sure that we had removed the obstructing portion in any case. At about this time we happened to meet three cases in which the Goodfellow operation had been performed, but in which the cystoscope showed obstructing portions of the prostate remaining or returned. If one could be sure of the entire removal of the prostate

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in this way (as I cannot) this operation offers the least dissection and the least post-operative shock and the largest per cent of operative recoveries. Yet, despite the fact that Ferguson, Mayo, Watson and other most excellent surgeons perform this operation by means of the so-called intra-urethral perineal operation, our experience points to a certain rather large per cent of cases in which the prostate is not entirely removed, and often the real obstruction remains or returns after the operation. It is not true, and I do not believe ever will be, that the eye in the end of the finger is as accurate as the eye in the head in distinguishing kinds of tissue, and we have long held to the principle in surgery that "blind" surgery is bad surgery, and we see no reason why an exception should be made in the surgery of the prostate gland. The enthusiasm of surgeons for their particular method of operation often carries them beyond the point of conservative statement and careful observation regarding their methods and their results. Men whose ability gives them phenomenal results are apt to leave the impression among the masses of surgeons that it is the particular operation which yields such wonderful results rather than the skill and knowledge of the operator.

We believe it impossible to exactly tell the point at which separation of tissue is taking place in a dissection made at the end of the index finger buried to the operator's eye, and within the urethra. To remove a gland in this way whose anatomical definition at best is not so clearly discernible from the adjacent tissue must necessarily be fraught with danger. There seems to me to be no good rule to prevent one from removing parts of the sphincter, even the trigone of the bladder, the seminal vesicles or the ejaculatory ducts rather than the prostate, under such circumstances. In our experience this operation cannot be

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recommended, either from a standpoint of thoroughness of removal of the gland or the obstructing portion of the growth, or one free from accident and injury to adjacent organs, and certainly any complication, such as stone in the bladder or carcinoma of the prostate, is not reached by this method. The prostatic urethra is often badly torn, and, therefore, the operation offers no arguments so far as conservation of the posterior urethra is concerned. A minimum post-operative shock and a comparatively small traumatism from dissection in the perineum seem to be the only arguments in favor of this method of procedure over the open methods.

(2) After the reports of Dr. Young we began with the larger incision and dissection, and found a very much better approach to the prostate. By the aid of the tractor we were able, in most cases, to bring the prostate well up into the perineal wound. We cannot but believe, however, that the diagrammatic sketches found in the fourteenth volume of the Johns Hopkins Hospital Report are somewhat overdrawn in this particular, and leave an impression that the bringing of the prostatic gland into the wound is more simple than our experience justifies or than I have seen any other operator succeed in doing. In some cases we have been unable to raise the prostate into the perineal incision at all, even with the most extensive dissection, which the anatomical area justifies, and with the most expert use of the tractor which we were able to command.

In a certain number of cases we have found the perineum so deep and the space between the tuber ischi so narrow that we have been bothered immensely with the problem of dissecting down to and around the prostate without injury to the surrounding tissue. We were never quite sure that the entire obstructing lobe of the prostate was removed, for the tractors

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often slip about and away from the obstructing lobe in a manner which is misleading and confusing. They do not always sink into the center of the intra-vesical projection as beautifully as the illustrations show. The enucleation is, therefore, often very difficult because of the inability to hold the prostate in position, and at times we have been compelled to remove the retractor entirely before we were able to determine the exact position of the remaining fragments or lobe of the gland.

We believe the traumatism to the cut-off muscle cannot help but be great, and as shown by Ruggles (*Annals of Surgery*, April, 1905) this is an important factor in control of the escape of urine. It must be severely injured in a number of cases. Not only the muscle itself, but also the nerve supply and perineal nerves and vessels, and a certain number of cases must result in incontinence.

We have never been quite sure just what has happened to the urethra at the time of operation, especially when the prostatic bar had developed up into the bladder. In some cases we are sure the prostatic urethra was torn and considerable portions of it removed. In one case at least a portion of the trigone was also removed. We have not been quite sure that the ejaculatory ducts on both sides were intact even when we have attempted to do the conservative perineal operation of Young. Upon macroscopic examination of the prostate gland afterward we have portions of the urethra in nearly every case, and in six of twenty-three we have found portions of the ducts.

The position of the patient as described by Dr. Young is a difficult position to obtain in most of our ordinary hospitals, and unless one has a rest constructed especially for this operation it is often difficult to obtain such a sharp angle in the back of the

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patient so that the surface of the perineum is parallel with the plane of the floor, and if just the ordinary Trendelenburg position is used the weight of the intra-abdominal organs draws the prostate, if anything, deeper into the perineum.

We are importuned to be careful to pass the instrument of cleavage into the correct layer of the capsule. We have never been able to choose by valuation the correct layer, we have always been compelled to follow the points of cleavage of least resistance, whether this was the correct layer or not, and oftentimes have broken the thin true capsule of the prostate and attempted to remove the gland by dissecting among the lobules, always with very imperfect success and sometimes with complete failure, so that we were compelled to remove a number of small fibrous adenomata which were in the prostatic stroma and practically none of the prostate itself.

In the removal of the median bar we have been compelled to tear the urethra often low down toward the vesico-rectal fascia, and were unable to remove the lobe with the skill some of the more dexterous operators describe with such eloquent and such attractive diagrammatic sketches, and the use of the finger as a tractor has been found, in most cases, impossible. We have nearly always been compelled to divide the recto-vesical fascia in a rather wide manner and to leave large pockets behind the same. These must necessarily interfere with sexual relations and form acceptable areas for the formation of localized abscesses.

Our results from twenty-three operations on the prostate by the perineal route have been as follows: —

One case died in two days after operation. In same case we perforated the rectum in the dissection. These cases have extended over a period of six years, and I am able to find only seventeen of them alive.

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One case had a fistula two years after the period of his operation and at the time of his death. The cause of his death was pneumonia. We have had no cases of incontinence, and none that I know about of dribbling or stricture.

Despite all the above-named technical difficulties, I believe this operation offers the following points of favor: —

(1) It is the operation which so far offers the nearest approach to an "open operation" for prostatectomy.

(2) The sexual apparatus may be preserved.

(3) Less of the urethra is destroyed than in the suprapubic operation, but the part injured, if any, is farther from the bladder and reaches to the posterior layer of triangular ligament and more liable to be followed by untoward results.

(4) It offers the best possible drainage for the bladder.

(5) It is particularly adapted to the small fibrous prostate, acting more as an obstruction by its contraction than by its size.

(6) It is best adapted when obstruction is projecting down into the perineum or against the rectum.

(7) The mortality is less than the suprapubic.

In addition to the technical objections elaborated above one may add: —

(1) It requires more experience and a better understanding of the anatomy and physiology of this region than does any other operation for removal of the prostate.

(2) It opens a large number of blood vessels and lymphatics in the dissection. Its traumatism is large, possibly in some cases affecting the perineal nerves and leaving the external sphincter paralyzed.

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The suprapubic method is recommended and done by Moynihan, Mikulicz, Freyer, Israel, and followed by many others.

We have done fourteen operations, all told, in this way with one death. The technical difficulties of this method have been comparatively few in our cases. Once I opened the peritoneal cavity, and this case died, but not until about three weeks after the operation. Whether this had anything to do with the death or not I do not know. There were no signs of peritonitis. In these fourteen cases we have not met with dangerous hemorrhage. The recoveries have been as rapid as the perineal, and, as I believe, the results as good. I have in one case found the patient had trouble after removal of the prostate, the principal complaint being pain in the urethra. In two cases it was necessary for the patient to use the catheter after the entire prostate had been removed. These were both men over seventy-five years of age, and in both of whom an atonic bladder was present. I do not feel that the removal of a portion of the tortuous and elongated prostatic urethra is a very serious matter, and in no case was I able to find any urethral obstruction caused by the removal of the portion.

Old cases of chronic cystitis, which had existed several years, usually continued to have pus in their urine even when the kidneys were healthy, in one case it was observed for five years. The presence or disappearance of pus does not depend upon either the suprapubic or perineal operation. It followed both operations equally so far as I was able to judge. It did not disappear in the old cases following either the suprapubic or perineal method. My experience in this regard may be unique and differs from many of the reports in the literature.

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The technical difficulties are few, but other more dangerous difficulties more than offset this advantage.

A large cavity is left in the region of the neck of the bladder. The drainage must necessarily be uphill for some two or three inches and the large pocket from which the prostate was removed forms an ideal position for the deposit of micro-organisms and urinary débris. Many advocate a boutonnière in the perineum as not adding much shock, and it seems to be a rational procedure. Ranshoff's trochar should in all cases be condemned as dangerous and unscientific. The opening into the bladder should be made well up into the fundus and not under the symphysis. The same point is made by Squier in "Surgery, Gynecology and Obstetrics" for this month.

A drainage tube in the bladder either larger or smaller, either one or two, is, in my judgment, contra-indicated, and the large hole in the base of the bladder is packed with iodide of bismuth gauze at the close of the operation and the serum and urine allowed to drain through this gauze. This prevents hemorrhage and infection, drains the serum rapidly from the wound, and when it is removed it leaves a clean, granulating surface.

After removal of the prostate, and before the bladder is packed with gauze, normal salt solution at a temperature of 120° is passed through the urethra by hydrostatic pressure without a catheter until the bleeding ceases. The bladder is then packed and the patient returned to bed, and in three days the pack is removed. No cases of secondary hemorrhage have appeared in our fourteen cases.

The following are extracts from a discussion on this subject in the American Surgical Association for 1909.

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DR. A. H. FERGUSON, Chicago, Ill.: Perineal. This is one of the most interesting subjects in the field of surgery. At the present time surgeons are divided in their opinions as to the best method of removing the prostate gland.

My first work was done suprapubically in twenty-five cases. (I must explain that at least four of these should not have been operated upon by any method.) I lost eight out of the twenty-five, one from hemorrhage. After this experience I determined to attack the prostate through the perineum. In over one hundred and twenty-five cases operated upon by this route, my mortality has been less than three per cent. I prefer the median perineal incision. The rest of the operation I carry out as I described it at the American Medical Association meeting in Boston, in 1906.

The prostate, which is most adherent at the neck of the bladder, must not be torn away when resistance to enucleation is met with; but the gross mass should be cut away with knife or scissors, leaving a layer of prostatic tissue, which is removed bit by bit with my prostatic bitting forceps. Since the prostate is also more or less firmly adherent to the prostatic urethra, the same precautions must be taken to prevent injury to the latter.

Even supposing you have to destroy two-thirds of the prostatic urethra, in nearly all cases you can preserve the anterior portion. I think the prostatic urethra can be more conserved by the perineal route, and, in fact, I know it. The finishing up of the operation is important. I sew up the perineum and prostatic urethra in all cases where the urine is not septic, and in about twenty-five per cent of these I get union by first intention without any leakage through the perineum at all. It is difficult to do this close to the neck of the bladder. A small drain should be placed at the lower angle of the wound, and a catheter through the penis. Experienced men who have followed the improvements of perineal prostatectomy do not injure the bladder, nor have they a fistulous tract, except possibly in septic cases, and not always in these. If there are stones and diverticuli present, the condition of the bladder can be found out through the perineum and the bladder treated by the subpubic route. Better drainage is thus obtained. The mortality, moreover, is twice as high by the suprapubic route.

DR. MAURICE H. RICHARDSON of Boston: Perineal. I, like most of the members of the association, come here to learn the experience of others, and I therefore welcome this discussion. I have seen a good many operate upon the prostate, but never

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yet a man who knew exactly what he was doing with reference to the urethra. My training has been that of an anatomist. I have never been able yet, by the suprapubic or the perineal route, to be sure whether in prostatectomy I was injuring the urethra or not. I have asked other operators, and they acknowledge that they do not know either. When I take out the prostate from above, I cannot believe that there is much left of the prostatic urethra.

As an anatomist I prefer vastly, in suitable cases, the perineal route. As Dr. Moore has said, the case is to be treated from above or from below, according to the results of the digital examination. Sometimes the suprapubic route has proved of the greatest possible ease, and the operation has been one of great rapidity, and has been followed by little if any shock.

What appeals to me and what interests me in these discussions is the experience of the different fellows of the association, and what interests me still more is the frank admission that these operations do have their drawbacks, and that patients seventy or eighty years of age occasionally die. I look upon this operation as an abdominal one, and it becomes, therefore, a considerable part of my work. I select methods and routes according to the case in hand; I am not bound in every instance to follow a certain method or a certain route.

DR. JOHN B. MURPHY of Chicago: Both. The operation of prostatectomy was approached by me first by the perineal route, and then by the suprapubic route, the reverse of Dr. Ferguson. The difficulties that I encountered in some of the perineal cases caused me great anxiety, so I changed to the suprapubic. Finally, after I had felt fairly secure in the suprapubic route, I encountered more difficulties, and then I concluded that both routes had advantages. Finally, after an experience of one hundred and twenty-three cases, I have come to this conclusion, that the small, firm, hard prostate can be taken out easily and more accurately from below. The large, thick, juicy prostate I can take out with greater ease and safety from above. Whether you make a little larger incision in the perineum makes little or no difference, because the deep excavation, if you take out the same amount of tissue, must be the same by both routes, and it is the deep structures which are the important ones. It is essential in operations from both positions to keep within the capsule.

A number of malignant cases can be recognized before the operation by the hard, ligneous nodules palpable by procteal

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examination. However, if all specimens are put through the microscopic examination, one will often find, to his great surprise, malignancy in a case in which he has not suspected it. To your gratification, a year or two later you will find your patient doing very nicely, and then, as is but to be expected, in another year or two he succumbs. But where the malignant disease has penetrated the capsule and invaded the connective tissue, the patient is worse from the day of the operation, and continues the downward course until he dies. The circumscribed carcinomata cases do very well after the operation, and the surgeon feels repaid for doing them.

Deaths in prostatectomy result from causes independent of the operation oftentimes, as sepsis, pneumonia, renal insufficiency, and sudden collapse in an old person from lowering the arterial tension; but if you are ready in such cases to at once fill the patient's veins with salt solution, you will be surprised how quickly he will rally. It should be administered, however, before the patient leaves the operating table. Experience aids one in selecting the time for operation and in guiding one to the proper preparation of the patient before operation, materially lessening the mortality.

DR. MOORE: As I stated, my paper was only suggestive to bring out discussion, and it has certainly had the desired effect. Dr. Bevan, as we all know, is a man of positive convictions, and has the courage to back them, so I expect in five years he will come in and read a paper before this association on the complication and sequels of suprapubic prostatectomy. He is very positive in his statements as to the superiority of the upper operation, but you will notice that there are a goodly number who are equally positive and have equally good reason for the lower operation. You will agree with me that Dr. Murphy stands on solid ground, fitting the operation to the case in hand.

Dr. Richardson asks how we are going to tell when the urethra is injured, and I say examine the specimens after operation.

DR. BEVAN: Perineal. I think the situation can be summed up as follows: That the evidence is quite conclusively in favor of the suprapubic operation from the standpoint of the completeness of cure and freedom from complications. That would be the opinion of the majority of surgeons. Then I think that probably the majority of surgeons would feel that the suprapubic operation was one that carried greater mortality than the

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perineal. Is it not possible to reduce the mortality rate of the suprapubic operation until it is as low, or lower, than that of the perineal? I think it is, and that the point brought out by Stillman has been well exemplified in some of my own recent work, that is, in an infected case making first a suprapubic drainage under nitrous oxide gas. Nothing has been more satisfactory than the secondary prostatectomy ten days, two weeks, or three weeks later, when the patient was in good condition, the operation being performed without any instruments whatever, simply through the fistulous tract with a gloved finger, with the patient under nitrous oxide gas. If that method is adopted and the badly infected cases first drained and prepared for prostatectomy, the suprapubic operation will have as little or less mortality than any other case, and the resulting cure will be more satisfactory and more complete.

Resumé: The dangers of total prostatectomy are especially the age of the people upon whom we are to operate. The mortality relation of different operations shows in perineal prostatectomy six to eight per cent, in the suprapubic between nine and eleven. With the constant increase in knowledge of the technique of this operation and the widening experience reduces the mortality. Freyer reports 644 suprapubic prostatectomies with 39 mortality, about six per cent, and Young 238 perineal prostatectomies with a mortality of 2.9. His last 128 operations showed no mortality.

Each of the operation methods has their advantage. The suprapubic shows the superiority of easier technique and a shorter time to complete. It is astonishing how often very large prostates can be removed by the suprapubic way in a few moments, particularly if one can shell out the prostate by starting in the right layer. The perineal method has the advantage, that it is more perfectly under the eye of the operator, but it has a difficult technique. The chief after-results of suprapubic prostatectomy is the bad drainage, a large round wound hole in the

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deepest part of the bladder assists in inclosing a part of the wound secretion and produces dangerous after-effects. This condition doubtless is responsible for the higher mortality figure.

Most patients lose their potency after a total prostatectomy. This appears to be much less frequent in the case of the suprapubic prostatectomy than in the perineal. It may be mentioned that Young and Fuller have both observed an increase in the potency after suprapubic operations.

Many operators prefer one method at one time and one method at another, depending on whether the prostate is enlarged down toward the rectum or whether the tumor mass extends up against the bladder. I believe that this is the proper position to take and it is better that the operation be made to fit the case rather than the case to fit the operation. The suprapubic is for me the easiest to perform. The short time of the operation, the infrequent appearance of complications, the ability to deal with complications, as stone, etc., and the short period of wound healing are the deciding factors. The healing of the perineal prostatectomy requires from six to eight weeks. When a fistula formation occurs it may last several months. By the suprapubic prostatectomy, in my experience, it is about a week shorter. In one of my last cases the suprapubic wound was entirely healed in three weeks.

My first suprapubic operation was done because I was unable to pass any guide whatever into the urethra, and fearing it would require considerable time to find the urethra in the prostatic region by the perineal, I decided to do the suprapubic operation and was pleased with its results.

In spite of the many opinions to the contrary given in this paper, I believe the suprapubic operation is slowly gaining ground among the American surgeons.

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In Germany and England it is now almost the only operation done, while in France, I understand, Albarran and Legueu are also doing the suprapubic more commonly than the perineal. We are now using a retractor for suprapubic operation, upon the end of which an electric light is placed in such a manner as to luminate the entire base of the bladder. By the use of this instrument the steps in the enucleation are more clearly seen. In certain cases in extremis the two-step suprapubic operation has proved advantageous. I believe, however, the cases are very rare when it is necessary.

I have attempted to summarize the present situation in the surgery of the prostate as I see it in America. I have laid stress on the difficulties and complications met with rather than upon the simplicities and successes, for I feel that already in American literature the operation of prostatectomy is too lightly regarded, and, therefore, often attempted by those whose training has not fitted them for this work, with disaster to the patient, to themselves, and to the discredit of a very valuable surgical procedure in proper cases.

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SOME HEMATIC INFECTIONS OF THE MALE GENITAL DUCT.

WILLIAM T. BELFIELD,
CHICAGO, ILL.

In the earlier aquatic animals testes and ovaries have no duct, their sperm and germ cells being discharged into the abdominal cavity, whence they float out of the body through openings (pores) in the body wall — a type that still exists in certain fishes. The earliest genital duct seems to have been a tubule of the original kidney, into whose open, funnel-like abdominal extremity the germ cells were received, thence wafted by cilia to the excretory duct of the kidney. This type persists in the female of many higher animals, including man; the flaring abdominal opening of the ciliated Fallopian tube apparently represents the early kidney tubule functioning as a genital duct. That human ova often fail to enter this primitive duct, and still escape into the abdominal cavity, as of yore, is indicated by the occurrence of abdominal pregnancy.

In the male of higher aquatic animals — fishes and amphibians — tubules of the anterior part of the kidney (mesonephros) become continuous with the tubules of the testis, constituting the caput epididymis. This arrangement persists in the higher land animals, including man, though the urinary part of the frog kidney (mesonephros) atrophies and is replaced by the mammalian kidney (metanephros).

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Yet even in the human animal the coni vasculosi (convoluted tubules) of the epididymis are lined with cylindrical, ciliated cells similar to those lining the convoluted kidney tubules of frogs and fishes, from which, indeed, the former are derived.

Hence, in origin and minute structure the epididymis is a kidney; that its phylogeny inclines toward its early urinary rather than its later genital affiliation is indicated by various clinical observations, and is strikingly supported by my studies on the sterility of the mule. I found that the male mule is sterile (though potent and amorous), because his testes do not produce spermatozoa. Yet while his testes exhibit this arrest of development, his epididymis is completely developed.

It seems plausible that this ancient kidney, the epididymis, should, like its successor, the mammalian kidney, be liable to infection from the blood current; and that some infections of the lower seminal duct — vesicles, prostate, urethra — may proceed downward from the epididymis, just as many infections of bladder and urethra descend from the kidney. That the tuberculous infection often does thus descend from epididymis to prostate is now generally recognized; but that other infections of the genital duct pursue the same course is not so commonly understood.

Yet there are many cases recorded in the literature in which acute pyogenic infection of the epididymis, the urethra being absolutely uninfected, has followed blood infection from an extra-genital source. Among the early examples is Kocher's[1] case of fatal pyæmia with pulmonary abscesses; the right epididymis and seminal vesicle were full of pus, but bladder, prostate and urethra were free from infection. Among the

[1] Pitha-Billroth, *Chirurgie*, Bd. iii.

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later examples is Gruber's[1] case of staphylococcus pyæmia, with abscesses in lungs and pericardium, left epididymis, vas and vesicle; testicle and urethra were free from infection.

One of my cases was a boy of seventeen, whose streptococcus infection of a tonsil was followed by the same infection of the right epididymis (pus evacuated), then of the right vesicle, and finally of the urethra; the gonococcus was absolutely excluded.

Such hematic infections of the genital duct suggest certain considerations: —

1. Anterior urethritis may be an extension of infection beginning in the upper genital tract. Many observers have described acute non-gonococcal urethritis and speculated as to their etiology, without mentioning the possibility of a descending infection from the upper seminal duct.[2] This seems the more notable, because it is well known that the epididymo-orchitis of mumps may be accompanied by a urethral discharge.

2. Acute and chronic prostatitis may result from endogenous as well as exogenous infections.

3. The seminal vesicle is known to harbor gonococci for an indefinite period; it seems plausible that it, like the gall bladder, may long harbor bacteria derived from the blood stream. Huet has proved this for animals, in which, after recovery from experimental infection, the pathogenic bacteria used were found in the vesicles even when other organs were sterile. Marchildon found the Eberth bacilli in the vesicles and prostate of two patients dead from typhoid fever; and others have found them in fluid expressed from prostate and vesicles after recovery from typhoid.

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[1] Münchener med. Wochenschrift, no. 19, 1911.

[2] Thus Hume (*Journal Amer. Med. Association*, August 6, 1910) records thirty such cases in which the absence of the gonococcus was definitely established.

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It is, however, not the acute, but the more insidious chronic hematic infections of the genital tract to which I desire to call especial attention; for these constitute a wholly unexplored, and, I think, most important domain in genital pathology.

It is well known that parenchymatous nephritis, the chronic as well as the acute, is commonly the result of bacterial infection of the blood; that the sources of this infection include the digestive, respiratory and cutaneous surfaces. Analogy suggests the possibility of similar chronic infections, from the same sources, of that ancient kidney, the epididymis. What are the clinical facts? Thickening and induration of one or both epididymes, especially of the head, without history of acute swelling, are very common in middle-aged and elderly men, often with contemporaneous hydrocele. In some of these the possibility of an ascending infection from the deep urethra is apparent; in others this can be excluded. Formerly I was accustomed to suspect tuberculosis in these indurations, merely because I did not then realize that many other bacteria than the tubercle bacillus enter the epididymis from the blood. Since I have made routine use of the tuberculin tests, I have found that most of these were not tuberculous. In operating for hydrocele, I have in late years incised the chronically hardened epididymis; in five of these cases there were small collections of pus; in one of these the staphylococcus in one the colon bacillus was identified.

The clinical import of such cases is illustrated in a patient recently brought to me by Dr. S. Rosenblum of this city, to determine the cause of the sterility of a marriage of four years' duration, the wife being pronounced normal. The husband, a vigorous man twenty-eight years old, denied all venereal infection. There was a painless, indurated

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thickening of the caput epididymis and vesicle on each side, and of the prostate. The tuberculin test gave negative result. The fresh semen contained myriads of perfectly formed spermatozoa, all motionless. There was no history of acute epididymitis. In a second, similar case, incision into the head of the epididymis disclosed actively moving spermatozoa, though in the emitted semen they were motionless.

Here are two cases of necrospermia and sterility, without other obvious explanation than a chronic parenchymatous epididymitis.

To summarize: —

1. The ancient kidney which now functions as the male genital duct — from seminiferous tubules to prostate — is, like the modern kidney, prone to hematogenous infections.

2. Hence we should enlarge our conception of these infections, hitherto dominated by the gonococcus, so as to recognize their frequent origin in the blood, as well in the urethra.

3. In the chronic, as well as in the acute hematogenous infections of both testis and epididymis, we may perhaps find the cause of much genital pathology hitherto unexplained, including azoospermia, necrospermia, impotence, sterility, hydrocele, prostatovesiculitis.

4. A rational pathology of these ailments embraces etiology as well as morbid anatomy; a rational therapy embraces more than strychnine, phosphorus electricity, prostatic massage and instillations.

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TUBERCULAR EPIDIDYMITIS; AN ANALYSIS OF ONE HUNDRED AND FIFTY-THREE CASES.

J. DELLINGER BARNEY,
BOSTON, MASS.

The cases on which this investigation is based occurred at the Massachusetts General Hospital. Although the patients numbered one hundred and twenty, they offer for consideration one hundred and fifty-three tubercular epididymes.

The subject is of importance for two reasons: first we do not as yet know the genesis of epididymal tuberculosis; second, healthy testicles are daily being removed under the impression that cure is more likely to follow. It is believed that the study of so large a number of cases will throw some further light on the subject.

The patient with tubercular epididymitis is generally young, between twenty-five and thirty-five years in forty-five per cent of cases. But that every rule has its exception is shown by the fact that the age of occurrence tapers off on the one hand to a baby of eighteen months, and on the other to a seventy-three-year-old iceman.

Incidentally, sixty per cent were married. Not that this is strange, for matrimony usually claims this number. But as it has been stated that the disease may be conveyed by coitus, I note that in not one of this number was there anything whatever to suggest that marital relations were the means of contagion.

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As the left side is usually guilty when it is a question of varicocele or gonorrhœal inflammation, it is noteworthy that in tuberculosis its fellow is involved in exactly the same number (thirty-six per cent) of cases, while both were diseased at time of entrance to the hospital in nearly thirty per cent.

As to the duration of his trouble the patient can give no very definite answer. In this respect it is strikingly different, with rare exceptions, from the epididymitis of gonorrhœa, with its sudden onslaught. The tubercular process builds slowly, often without arousing suspicion of its presence, till finally the victim awakes to find himself hopelessly entangled in its meshes. The answer to our question of "when" is therefore to be taken, not as the time of actual onset, but as the moment when considerable advance has been made.

Fifty-three per cent noted the presence of the disease within the six months preceding their appearance at the hospital; in a few it was only a matter of days. Thence the time lengthens till five or six years have elapsed since the process began, and during which the smouldering fire has more than once broken into flame, only to be quenched with a poultice or a bag of ice. Moreover, out of ninety-five patients, forty-three acknowledged the performance of more or less minor surgery in a vain effort to stamp out the disease. This interference was usually the tapping, often repeatedly, of a hydrocele, which so frequently accompanies the tubercular process. In a larger number than one would like to see, the family doctor had merely lanced the abscess, thus prematurely giving birth to the sinus which is so common.

As possible exciting causes, gonorrhœa and trauma were inquired for. Of the former, out of a possible ninety-five, only thirty-four (thirty-five per cent) confessed infection. This percentage would un-

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doubtedly be greater were it not for deception and ignorance. With one exception, no case showed definite evidence that the tubercular invasion of the epididymis followed a gonorrhœal inflammation. This, together with the fact that most of these patients had never had venereal disease, inclines us more strongly than ever to the belief that there is little if any connection between the two.

Trauma also is of small import, as a history was obtained in only eighteen out of a possible ninety-two.

Coming now to the results of the disease, subjective and objective, what do we find? Firstly, that eighty per cent of those questioned on the subject had lost weight, an indication of the insidious and far-reaching nature of the disease. In some the depletion of flesh and strength was extreme, even in the absence of demonstrable lesions other than those in prostate and epididymis. On the other hand, one is struck with the fact that a few (five) men had put on weight in spite of their affliction.

Pain was a symptom in sixty per cent. In striking contrast to the agony of a gonorrhœal process in the same location, it is usually mild, often trifling. During one of the characteristic "flare-ups" pain is intense, abating with rupture of the abscess and the establishment of fistula, or by absorption of its products. Its usually mild character may be explained, perhaps, by the slowly progressive nature of the inflammation, with simultaneous softening and absorption.

As an accompaniment we find tenderness, not intense, barring always the very acute cases, but, generally speaking, of only a moderate degree, its intensity doubtless being regulated by the same factors which produce pain.

An adherent scrotum, with or without fistula, was noted in sixty-seven per cent of the epididymes, while sinuses were observed in fifty-three per cent.

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These, then, are important factors in diagnosis, and may be considered true "earmarks" of tuberculosis in this region. More often than not the fistulæ were active, in others the sinuses showed a volcanic intermittency. We have seen scars of old sinuses, healed for years, and found under them an epididymis containing pus and likely to erupt at any moment.

Conspicuous by its absence is fever. In only ten cases was the temperature over 100 degrees Fahrenheit before operation, the epididymes in these being in the stage of acute exacerbation. Tubercular epididymitis, as commonly seen, and uncomplicated, does not, therefore, produce temperature.

Whence the epididymal infection? Is it primary, is it secondary to tuberculosis of the prostate, or is it one of the points of exit of a general genito-urinary tuberculosis? It is the writer's belief that the disease is secondary to prostatic tuberculosis, and that a concomitant general infection of the genito-urinary tract is rare, at least at the outset. The evidence embodied in the material at hand seems to justify this belief.

In one hundred and twelve cases definite data are at hand on the question of past or present tuberculosis in other organs than prostate or epididymis. In seventy-two, or sixty-four per cent, there was no demonstrable evidence of its presence at time of entrance elsewhere than in the organs mentioned.

Tubercular infection in the past, and presumably cured, was found in only seven, or six per cent. Its distribution was lung, three cases; bone, two cases; larynx and kidney (nephrectomy six years previously) each one case. In these patients either the fire was still smouldering, enough at least to light up the epididymis or prostate, or else these organs became involved at the outset and remained quiescent for years.

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Active tuberculosis was noted in twenty-nine per cent, its distribution being as follows: lung, twenty cases; bone, eight cases; kidney, three cases; larynx, two cases; cervical or inguinal glands, two cases; peritoneum, one case; meninges, one case; ischio-rectal fossa, one case. In the majority the disease had "stayed put" in the organ in which it began, whereas in the cases analyzed by Keyes[1] it was always "flitting between bone and lung and urinary tract," as that writer so poetically describes it.

In Keyes's series renal tuberculosis occurred eleven times, whereas it was demonstrated before, or at the time of entrance of our cases in only three.

Thus it is clear that the majority of patients do not have demonstrable tuberculosis in organs other than those for whose treatment they present themselves, and it is equally clear that epididymal tuberculosis is not an index of a general genito-urinary infection.

As evidence that the prostate is responsible for most of the epididymal infections we find that in two-thirds of the cases (sixty-seven per cent) this gland is clearly tubercular, with the probability that at least a portion of the remaining prostates are more or less so. Examination of the seminal vesicles tells the same story, for here also sixty-three per cent are unquestionably tubercular, and the condition of the remainder may well be regarded with suspicion.

Now, if the prostate is to be considered the guilty party it should produce vesical symptoms and an abnormal urine. This is found to be the case, for in as many as thirty-eight per cent of a possible seventy-six vesical irritability of varying intensity was observed. Running parallel to this it is found that out of one hundred and four urines, forty-three per

[1] *Annals of Surgery*, June, 1907.

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cent contained blood, or pus (sometimes both), and that in seven out of eight cases the guinea pig test showed the presence of the tubercle bacillus.

An inquiry into the sexual life of these patients was made in twenty-two. In fifteen there was no diminution of appetite or potency; the others had yielded to the enemy more or less completely. In his admirable paper Keyes has intimated that azospermia will be found in men with one tubercular epididymis, indicating a similar process in the prostate. The evidence that we can furnish, together with that which Keyes submits, forms a firm foundation on which this theory can rest.

In four cases, each with one tubercular epididymis, and with a prostate that could only be classed as doubtful, the semen was sterile. On the other hand, one patient, a physician, writes me that since the removal of his afflicted member he has become a proud father, while our friend the iceman, mentioned elsewhere, and now in his seventy-third year, claims to have become a father four years previously, even though his disease began four years before that happy event.

Again, the prostate is indicted on the evidence furnished by the well-known tendency to involvement of the second epididymis after removal of the first. In this group it had become so infected nineteen times, the patient returning for operation on the opposite side. In ten of these the infection had occurred within a year of the first operation, the others hanging fire for periods of time up to four and one-half years in one case.

A more intimate view of the prostate was obtained in three cases dying after operation of a general miliary tuberculosis, and coming to autopsy. In two there was an invasion of practically every organ, including prostate and vesicles. In the third the

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infection was as general, but strangely enough it skipped bladder, prostate, vesicles and remaining epididymis in its haste to complete the task. This case is to be regarded as important, and will doubtless be seized upon with avidity by those who believe that the epididymal process is primary. None the less, no absolute proof is at hand, nor is it likely to be, but, taken as a whole, the case against the prostate is bad. If the epididymal process is primary, then its extension to the prostate is so early that no clinical means can detect it.

In the hope that microscopic examination of the epididymes would shed some light, our clinical pathologist, Dr. William F. Whitney, kindly looked over a large number of sections for us. Generally speaking, the tubercular process was intertubular, involving only the surrounding connective tissue, and leaving the tubules intact. This would suggest that whether the primary process is prostatic or epididymal, its extension in either direction is by the lymphatics or blood vessels, and not by the vas deferens. This opinion is not to be taken as final, and further work in this direction is contemplated.

Two patients died in the hospital within a month of operation, of general miliary tuberculosis. That the scalpel served as a torch there can be no question, the situation being comparable to the fatalities sometimes seen after excision of tubercular cervical glands.

The fly in this ointment lies in the operative treatment. Let me take the plunge and say at once, that from one hundred and fourteen patients there were extracted ninety-two testicles, four of them double. As if to justify this useless slaughter of comparatively innocent organs, the records state that the testicle itself appeared to be involved in sixty per cent. So be it. Pathological and clinical experience do not,

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however, bear out this statement. In seventy-one cases in which a pathological report was given, twenty-one were definitely free from tuberculosis; fifty were described as tubercular, but as the records make no distinction between epididymis and testicle, it is impossible to draw any conclusions from them. The writer's experience, and that of others, has been that a very small percentage of testicles in such cases are invaded by the tubercle bacillus to such an extent that orchidectomy is indicated. It is a fact, to which most will agree, that even when the testicle is affected, and that to a considerable degree, the fire burns itself out when the fuel furnished by the epididymis is removed. As proof of this we offer the records of fifty epididymectomies, single and double, with and without vasectomy. Of this number, not one has reappeared for subsequent orchidectomy, and in an investigation of the end results of these cases, to be published later, no relapse in the testicle itself has been found. We have recently seen a case which seemed to be the exception. A tubercular epididymis had been removed some months previously. The patient reappeared at our clinic lately with an acutely inflamed scrotum, and every evidence of orchitis. Operation showed the testicle itself to be perfectly intact, the seat of the trouble lying in the tunica and peritesticular tissues. We recognize the possibility of an invasion of the testis, especially in the later cases, and do not deny that the removal of an organ which the patient, at least, regards as ornamental, if not useful, may be necessary. But such an event is rare, and even a partial orchidectomy generally serves the purpose, as shown in five of our cases. That epididymectomy may cause the tubercle bacillus to hasten its step toward the other side we do not deny, but that the march is rapid in any event is equally true. Of thirty-three unoperated double in-

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fections of the epididymis, the second side became involved in eighteen (fifty-five per cent) within one year of the time of invasion of the first side. Among the operated cases, as stated elsewhere, ten out of nineteen (fifty-two per cent) returned for operation on the second epididymis within one year after removal of the first. In the case of the second epididymis it seems to be "Heads, I win; tails, you lose."

We have all seen the serious mental derangements which have followed the old operation of castration for the relief of prostatic hypertrophy; we all recognize the importance and power of the internal secretion of the testicle. If the influence of this secretion is essential for a grown man, how much more vital is it for a baby or growing boy. In the face of these indisputable facts, and knowing that the invasion of the second epididymis is more than likely, no surgeon is justified, with rare exceptions, in removing a testicle.

Epididymectomy, with vasectomy, when properly done, is so simple a procedure, so devoid of risk and reaction (in only twenty-four cases did the temperature exceed 100 degrees Fahrenheit after operation), and so much a source of satisfaction to the patient, who, as it were, has his cake and eats it too, that its performance is amply justified. Furthermore, knowing the life history of the disease, and finding the patient already sterile, as we shall in a very large majority of cases, we feel justified in advocating the removal of both epididymes and vasa at one sitting.

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DISCUSSION

OF PAPERS OF DRS. STOKES, BELFIELD AND BARNEY.

DR. G. SHEARMAN PETERKIN of Seattle: I am very much interested in Dr. Barney's paper, because out in our community there are three of what we call old timers, and I have lost in six months two of my cases of tubercular epididymitis to the old timers because they said they wanted the testicles saved. Now all these old timers believed in doing was to incise the epididymis, drain and let a sinus form so they would continue to drain, and I have been told by them since that a sinus would stay open sometimes as long as a year — one of them is over a year and a half old. He had double epididymitis, tubercular, no gonorrhoeal history, and he had gained weight. So I am very much impressed with Dr. Barney's paper, because it obviates a sinus and leaves a man in the belief that potency is still his. I believe this paper will be of benefit to the genito-urinary surgeon.

DR. CHARLES E. BARNETT of Fort Wayne: Dr. Belfield's paper was especially interesting to me. Often when I was a little boy I wondered why a mule didn't colt. That was always a question. I remember they used to, in order to breed stallions to jennets, blindfold the stallion. It was a question to me why they didn't breed mules to mules to get mules. But not so. The mule was always either the progeny from a jackass and mare or a jennet and stallion. His explanation of the degeneration of the spermatic epithelium is well taken.

While Dr. Belfield was reading his paper in regard to the infections of the epididymis that are similar to kidney infections, the question in my mind was whether that could be true or not. If we have an analogue, though, of kidney tissue in the epididymis we could of course get an hematogenous infection in the epididymis as well as in the kidney.

Dr. Barney's paper was unusually interesting to me. He brings out the same point in regard to infection of the epididymis. In his paper he spoke of tuberculosis of the prostate being secondary to tuberculosis of the epididymis, the infection coming by way of the blood. I think tuberculosis of the vesicles by way of the vas on account of the block in the ejaculatory duct would be an easier way than hematogenous infection, but the prostate emptying at the side of the utricle, not nearly so far back as the

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emptying of the vesicles into the vas, at the junction of the ejaculatory duct, the prostate would have a harder time to get a contact infection to the epididymis — harder than from the vesicle.

Within the last few months to me tuberculosis of the genital tract has been more pronounced on account of the use of autogenous bacterins, especially in cases that do not seem to get well rapidly. It has been my experience to find that the majority of these cases show a tubercular subcutaneous reaction. The case in which the bladder neck is dilated, the drainage is good, getting his own vaccine, but does not recover rapidly, his benefit seems to be little — one out of twenty would be the only one that would miss the tubercular subcutaneous reaction. If Dr. Belfield is here he will remember a case of infection of the vesicles that I referred to him of a man who was the picture of health, full sanguine appearance, no one would suspect he had tuberculosis, and yet he gave the tuberculin reaction and has tuberculosis of the vesicles. So I believe that if you will make a tuberculin reaction test as a routine in these kind of cases it frequently uncovers a non-suspected tuberculosis of the prostate or vesicles.

DR. W. W. TOWNSEND of Rutland: I would like to ask Dr. Barney in what percentage of cases of epididymitis he determined an involvement of the prostate by an examination of the urine: in other words, what percentage of cases of tuberculosis of the prostate had a perfectly clear urine and in those cases what led him to believe that the disease started primarily in the prostate? Did you determine it by rectal palpation, or what technique did you follow in making a diagnosis?

DR. GEORGE W. WARREN of New York: Tuberculosis is not a pyogenic process. Pus formation in the epididymis in these cases is due to secondary infection. I should like to ask Dr. Barney if he could make a diagnosis of tuberculosis before operation. Application of the tuberculin test and production of a reaction would not settle the question, because a tuberculous gland elsewhere would also give a reaction. I should also like to ask the time of operation. I have operated on about twelve cases when they were very acute and there was pus in the epididymis. On opening these cases there was found a tuberculous lesion associated with suppuration. The pyogenic agents ascended through the vas, so that when the vas was incised pus escaped. The question in my mind was what to do with the vas. In one case in particular the vas and seminal vesicle were very large. When

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the vas was cut a large amount of pus flowed out. I tried to liberate through the internal ring the vas from the bladder from behind and remove it. The vas was so badly involved, however, that I did not care to excise it; so transplanted it into the skin and left it open. That drained the vas for some time after the operation. In other cases where no pus was present the vas was tied and cut off at the internal ring. Shall we wait until the pus has cleared up, or shall we operate immediately?

DR. HUGH CABOT of Boston: There are a number of points I should like to discuss, but as the time is short I shall talk upon Dr. Barney's paper only. The warrant for our very strong belief that epididymo-vasectomy is the operation of election stands upon two legs. In the first place, our belief that the pathology of these cases, if followed out, shows that the infection is most important in the epididymis, secondary, if at all, in the testicle, and that probably only a small percentage of testicles will show important infection. The infection of the testicle with the tubercle bacillus is a very mild affair and will recover of its own accord without the interference of the surgeon. In the second place, epididymo-vasectomy seems to stand upon a ground which I think will appeal to us all, as shown by a recent case. Two years ago I recommended to the hospital a case of tuberculosis epididymitis on the right side. It went into the general service, and the classical operation of orchidectomy was done. Three weeks ago that same patient returned with involvement of the other epididymis, and I sent him to my colleague who operated upon him before, with the request that he carry out the logical procedure — take out the other testicle. Now no one in his senses believes that that man will permit that operation. Had the operation of epididymo-vasectomy been done in the first place, the same operation could now be done on the other side with the patient's consent. Patients will not object at all to the removal of the epididymis and the vas, but no man will submit to the removal of one testicle if he believes, as I believe, that following that procedure the other epididymis must become diseased in more than half the cases within two years. Those are the facts. If we do orchidectomy upon one side, we should logically do it upon the other. Removal of the epididymis will give a satisfactory result in the vast majority of cases. In a few cases the testicles will be involved, and may later have to be removed.

The operation which we do is to remove the epididymis through an incision in the scrotum, a short incision which can,

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if desirable, be done perfectly well under cocaine anesthesia. The epididymis is enucleated, and the lower inch or two of the vas cut away. A clamp is placed upon the proximal end and then is pushed up through the inguinal canal, guided by the finger, until the point lies over the internal ring. The handle of the clamp is then depressed, and a half inch incision is made over the point of the clamp. The vas up to the internal ring is now free. Holding the vas the finger is passed through the wound, the vas is freed well down into the pelvis, clamped, divided, cauterized and the stump dropped back. I for some time tied it, but as I noticed that the ties practically always pulled off, I gave it up. I have not had the courage to follow the guide of some of our German colleagues who pull the vas out by the roots. It can be clamped in such a way as to crush the small vessel which generally accompanies it, and no further trouble will result. We have not seen any trouble from leaving the stump of the vas in that way. I have seen much trouble result from leaving it in the inguinal canal. It seems to me an easily performed and clean operation.

DR. BARNEY: In regard to the suggestion of Dr. Peterkin about the incision into the epididymis and the subsequent establishment of a fistula, I have only to say that the operation of incision and drainage of the epididymis is quite as long and difficult a procedure as actual epididymectomy, where there is absolutely nothing to cut through but the parietal tunica and a very thin layer of visceral tunica vaginalis with which the sulcus is lined. I did not understand that Dr. Peterkin advocates that, but if he does, or if anybody does, I should like to protest.

In regard to Dr. Townsend's question, out of one hundred and four urines, forty-three per cent contained blood and pus, and in eight cases where the guinea pig was inoculated seven of them showed the reaction.

With regard to diagnosis of the prostate, we rely upon rectal touch, together with the combination of vesical symptoms and the condition of the urine. In other words, those, together with cystoscopy, are the only means at our disposal. Unfortunately, we cannot explore the prostate in these cases.

Dr. Warren's question has been fully answered by Dr. Cabot's remarks.

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PSEUDO-HEMAPHRODITISM. REPORT OF A CASE.

HENRY J. SCHERCK,
ST. LOUIS, MO.

The members of this association will no doubt be interested in the accompanying photograph of the genitals of an individual who was brought to my attention through the courtesy of Dr. Thomas A. Hopkins. The case is of such extreme interest that I feel certain that a report of the result of my examination will prove of great interest to the members. He announced himself as a Miss (?) X., age forty-one; nativity, United States. The individual since childhood has always been healthy and has suffered only from the ordinary diseases of childhood. At thirteen he claims to have menstruated through the vagina; this continuing until he arrived at the age of eighteen years; since that time he has seen no sign of menstruation. He acknowledges having masturbated quite a great deal for a number of years, and says that he has a distinct orgasm at the sexual climax, discharging a quantity of "sticky" substance from the meatus at that time. I have had the opportunity to examine this discharge and find it free of spermatozoa. He has always believed himself to be a female — his life has been spent in those duties which are usually associated with the female sex.

This individual is about five feet, eleven inches tall, rather strong, though feminine; hair on head, iron gray; no hair on face; his arms and legs are not

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distinctly feminine in conformation; on the contrary, they are rather inclined to the masculine type; his hands and feet are very large. The conformation of the pelvis is neither markedly masculine nor feminine. The breasts are flat and masculine in appearance, though devoid of hair. He states that one breast was for a time considerably larger than the other, but that it has gradually shrunken until there is now no marked difference between them. Beyond these points there is nothing noteworthy in his conformation except what is developed in the genital examination, which reveals the following: —

The pubis is well covered with hair; the upper margin is horizontal and does not incline upward in the middle line, the female type. In place of the clitoris is a well-marked penis, two and one-half inches in length when in a flaccid condition. On erection he states that it doubles in length. The glans is well developed and the corona distinct, and there is a marked hypospadias of the glandular portion of the penis. The labia minora extend downward only about two inches and cover the penis above, resembling in appearance the normal prepuce. Below the penis for one and one-half inches is a space which leads to a rudimentary vagina above and close to the opening of which is the urethral opening. The vagina is only three inches deep and ends in a blind pouch; no cervix can be felt. The rugæ are well marked throughout this rudimentary vagina. A rectal examination was then made, to determine the presence of a uterus, but I could not determine any, though anterior to the lower portion of the rectum a small body, fixed in position, about the size of a chestnut, could be felt which in every way answers the description of the prostate.

The anus and rectum are normal. As the labia majora descend on either side they appear loose,

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resembling when brought together in the median line over the underlying vagina an ordinary scrotum. They contain testes of normal size and shape, the right being larger than the left. The feeling of these two organs is identical to the normal testicles. The vasa can be distinctly felt running upward to the ring. On the posterior surface of these two ovoid bodies in the labia majora can be felt what resembles in every particular an epididymis. On the right side, he tells me that at one time it became very much swollen, and a nodular epididymis can now be felt on that side. He claims never to have undertaken or allowed sexual intercourse with either male or female.

The case is one which, judged from the sexual organs, demonstrates the person a male, though this is doubted by a competent observer in our city, who takes the position that the bodies in the labia majora are ovaries; but we have yet to learn how he explains the other definitely male development.

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UROLOGICAL SPECIMENS AND INSTRUMENTS.

G. KOLISCHER,
CHICAGO, ILL.

The specimens I am presenting were selected from the point of view that each of them proves or at least illustrates a point. The first specimen is a colossal cystic tumor of a kidney. This tumor is not only interesting on account of its size, but the history of the case and the structure of the tumor are apt to throw some light on the theory of these formations. There is still a difference of opinion as to the origin and the nature of these cystic renal tumors. In this particular instance the question is whether a cystic kidney in an adult be of congenital character, whether it has to be considered as a consequence of arrest of development, or whether it is a malformation or a true neoplasma.

If we consider that this specimen comes from a man of forty-five years of age, that he never showed any symptoms until about three years ago, that three years ago urine was drawn by a urologist out of this kidney by the use of a ureteral catheter, and if we take into consideration that great areas of the specimen are occupied by solid tissue, it seems that the conclusion is justified to consider the cystic transformation of this kidney as a multilocular adeno-kystoma in the sense of Witte.

The next specimen is a rather large pyonephrosis. You will see that there is practically no kidney sub-

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stance left; the whole organ is transformed in a sac with rather thick walls. This specimen serves to illustrate the dignity of the bacillus coli infection. The bacteriological examination showed a pure culture of colon bacillus to be present, and it is also interesting from the fact that the clinical symptoms were out of all proportion with the degree of destruction shown in the specimen; it was impossible to palpate this rather large kidney tumor; the reason for this became apparent after the kidney was exposed; it appeared as a flabby, sausage-shaped bag that of course could not be felt through the abdominal wall. This case is also instructive in this respect, that the other kidney also furnishing urine containing leucocytes and hyaline casts quickly recovered after the removal of its pyonephrotic mate, and is secreting now a normal amount of clear urine.

The next specimen is an oxalate stone of the size of a pigeon's egg removed out of the pelvis of a kidney. Strange to report this stone did not show in two X-ray pictures, but the clinical symptoms were so classic that the diagnosis could be made without this laboratory aid. The patient complained of pain in the left kidney region every time, after having had a ride on a street car or in a buggy, blood always appeared in the urine after such a shaking up, and could be seen with the cystoscope as coming out of the left ureteral opening. After the kidney was exposed the stone could be felt in the pelvis and was removed by a simple pyelotomy — speedy recovery followed and the patient has remained in good health since the operation.

The next series of specimens on exhibition contains eight prostatic glands removed out of old men on account of hypertrophy causing urinary obstruction.

These specimens were selected out of my collection of prostates removed by me, for the following reasons:

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These specimens were gleaned by suprapubic prostatectomy, they all represent favorable results as to primary recovery and as to remote function, and each of them contains the prostatic urethra.

Each specimen is split in two and clapped open, and on each half there appears one-half of the prostatic urethra split lengthwise. The presence of the urethra was not only diagnosed by the macroscopical appearance, but also by the microscopical revision of sections taken from the mucous canals running through these prostates. A study of these specimens will lead to some rather significant conclusions.

It becomes evident that in cases of annular hypertrophy of the prostate the prostatic urethra becomes so embedded into and so intimately attached all around to the prostatic tissue, that the removal of the prostate without taking along the prostatic urethra will appear as a technical problem of almost unsurmountable difficulty, a scrutiny of these specimens is apt to somewhat impugn the reliability of reports to the contrary. The history of these specimens and of their former carriers prove, furthermore, that the removal of the prostatic urethra is an incident absolutely immaterial for the success of the operation, as all the specimens in question represent perfect results. The two largest specimens are of additional interest because they come from emergency cases; there were taken out of the two patients whom I demonstrated this morning — you will remember that one told you that he was eighty-five years at the time of the operation, which took place more than a year ago, and the other one seventy-five at the time of operation, done five months ago. Both patients were brought to the hospital with a history of urinary troubles, covering a good many years past, both had had repeated urinary hemorrhages during the last month; in either case the bladder

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was transformed into a solidified tumor reaching up to the umbilicus, evidently due to the caking together of coagula; in neither case was it possible to pass a rigid instrument into the bladder, and the catheterization with elastic catheters was resultless. Twenty-four hours previous to his admission to the hospital an outside surgeon tried to relieve the older man by puncturing the bladder through the abdominal wall with a trocar — no result. Both patients were in great distress and absolute retention existed. In order to answer the two indications existent, to empty the bladder and to check the hemorrhage, immediate operation was decided upon, which after the bladder was opened suprapubically, developed into a prostatectomy, which in either case furnished a completely satisfactory result. All these specimens in connection with the history of the pertinent cases are apt to illustrate the possibilities of suprapubic prostatectomy — the two emergency cases help to prove another contention, that I brought up repeatedly, namely that in certain cases of urinary retention it is impossible to make an exact diagnosis, which will direct our surgical efforts, unless the bladder is opened suprapubically, thus permitting a thorough inspection.

I am going to demonstrate to you now two appliances designed for keeping dry patients with a suprapubic bladder fistula. One is a German modification of Irving's apparatus. It consists of a celluloid cup that by means of elastic straps is fastened over the opening; a tubal attachment conveys the accumulating urine into a urinal fastened to the thigh of the patient. This apparatus works quite satisfactorily, if no attempt was made to close up the bladder and the incision in the abdominal wall; but if sutures have been inserted the patients don't stand very well the pressure on the suture line; more satisfactorily

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works the other appliance which was devised by my assistant, Dr. C. M. McKenna. It consists of a double rubber apron with an enclosed pouch that has also an outlet to a urinal. This appliance is very well borne by the patients; but it closes water-tight only in rather obese patients.

Finally, I want to show the retractors that I use in bladder and kidney work. They are polished to the efficiency of a mirror, and if inserted reflect so much light in the cavities exposed that the work in there is considerably facilitated.

DISCUSSION

OF PAPERS OF DRS. SCHERCK AND KOLISCHER.

DR. BRANSFORD LEWIS of St. Louis: This exhibition of instruments is interesting, but I want to speak only about the two patients shown by Dr. Kolischer who had had emergency prostatectomies after failure to catheterize or cystoscope. The large improvement in the success of prostatectomy and the great decrease in mortality connected with prostatectomy is due not altogether to perfection of operative technique, and so on, but in my opinion very largely to preliminary treatment that is now so frequently carried out. Such patients get septic, often uremic, with a marked tendency to either decrease or suppression of urine. The preliminary treatment lifts them out of this slough of despond, and pulls them up into active urinary secretion, and to a renewal of health, and to my mind that is the biggest factor in the reduction of the mortality from prostatectomy. If that be the case, emergency prostatectomy is an illogical procedure, and one that I could not support, and I would not like to see this association placed in the position of supporting it. I do not take the same position about catheterizing a prostatic obstruction that I would about catheterizing a urethral obstruction due to stricture. In numerous cases I have failed to get any kind of an instrument through a marked, deep urethral stricture, and have resorted to external urethrotomy or maybe puncture once or twice. But I do not remember a case of prostatic obstruction in which I could not get some form of instrument into the bladder,

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relieving thereby the complete retention, establishing a continuous mode of drainage that changes the whole aspect of affairs for that patient. I am yet to be convinced that Dr. Kolischer could not get any mode of drainage into these two patients and avoided for the time being the prostatectomy which night have been put off until the next week or two weeks from the time that it was done under emergency conditions.

As to his failure to make a diagnosis before doing prostatectomy, I want to enter a mild protest there also. I am yet to be convinced, being from Missouri, that one could not have been made and a definite diagnosis of the prostatic condition made before the prostate was attacked.

DR. J. L. BOEHM of St. Louis: I would like to ask Dr. Kolischer if he is still using ligature of the upper and lower extremities in prostatectomy.

DR. D. N. EISENDRATH of Chicago: I should like to show a specimen illustrating severe hematuria from one kidney chiefly, and at the time of operation we thought it was from only one kidney, but further observation showed it from the other kidney. The history is as follows: A man fifty years of age for about a month prior to his admission to the hospital had passed a quantity of blood in the urine. The bleeding had been quite severe at times. The amount of blood lost was so large that there was some suspicion of malignant disease lower down than the kidney. Cystoscopy was done on suspicion of carcinoma of the prostate. I mention this especially, because the later findings were rather unsatisfactory compared to the amount of blood. Microscopic examination was made for me by Dr. Koll. It showed that there were very few red cells from the right ureter, but a large quantity from the left ureter; no casts, but distinct traces of albumen from both sides. We explored the left kidney from which the hemorrhage could be seen coming, and found the following condition, which is well shown in this little water color which was made for me after removal of the kidney. It shows first, macroscopically, a rather moderate-sized kidney on whose surface you will see a large number of little petechæ, but in reality are dilated vessels. Otherwise the kidney shows what the pathologist pronounced as a typical condition of chronic diffuse nephritis. I present this case especially in view of the fact that Dr. Peterkin was of the opinion that a unilateral process was present in the majority of cases. I believe that we will

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find that a unilateral nephritis, although it does occur, is comparatively rare, and that in the majority of these cases the hemorrhage will probably continue in some degree even though we remove the kidney.

DR. WILLIAM E. LOWER of Cleveland: I was very much interested in the specimen of the normal kidney. I believe the excuse for removing that was the fact that the pelvis of the kidney had been badly torn in removing a stone. About two years ago I had a case of very rough stone in the pelvis of the kidney, and in taking it out the pelvis was very badly lacerated, and it did not seem that it could possibly be repaired. I did not want to remove the kidney, so I excised that part of the pelvis of the kidney and made an anastomosis, believing that if it did not heal it would be better to take the kidney out afterwards. A urinary fistula remained for about two weeks and then closed. There was no further leakage. In six months I cystoscoped and found urine coming from that side. I believe a plastic operation should be undertaken before a normal kidney is removed. I can vouch for the efficiency of these highly polished retractors shown by Dr. Kolischer. I have used similar ones for a long time in bladder work, only I have a flexible retractor that can be bent as you wish during the operation.

DR. R. L. RIGDON of San Francisco: With reference to the matter of operative treatment of cases of unilateral hematuria associated with nephritis I would ask, would simply splitting the kidney and thus changing the venous circulation be sufficient, or must the kidney be removed?

DR. GRANVILLE MACGOWAN of Los Angeles: Like Dr. Lower, that healthy kidney that was exhibited put me to thinking. A couple of years ago I was in the clinic of the Mayos at Rochester, and Will Mayo was operating upon a kidney for multiple stones in the pelvis and in the lower calices and in the ureter. Many of them were quite rough, and in getting them out the pelvis of the kidney was very badly lacerated and also the ureter. The blood vessels were intact. Long after the show was over Will was in the amphitheater darning that pelvis just exactly the way a woman darns an old sock. I asked him, "Why do you take so much trouble with it? It would look to me as if you could not save that kidney anyway." He said, "I will tell you. You can sometimes save a kidney in a condition of this kind. Take a chance of saving it. These stitches sometimes hold,

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and though there may be a fistula which will last for some time, it will heal up. I can take this kidney out at any time. He has stones in the other kidney, and this kidney is the better one of the two. If he survives and these stitches hold, then we can operate on the other kidney, and perhaps I may be obliged to sacrifice that one." That looked pretty good to me. I have been obliged to take a sound kidney out because of tearing the blood supply, but that looked like a good thing to me, and if the opportunity ever arises I think I shall pursue that method with the healthy kidney, because God doesn't give you eyes twice or kidneys twice.

DR. GEORGE W. WARREN of New York: Several years ago, when operators opened the ureter, they were very careful to sew it up and place a drain down to it. In recent years it is left wide open, especially in Erdmann's operation, where the peritoneal cavity is opened, the stone located and removed from behind the peritoneum and the latter sutured. The wounds heal very rapidly. As a rule, the urine is discharged through the wound for only three or four days.

Four or five years ago I had to cut a rib in order to deliver the kidney into the loin. The assistant in holding the kidney lacerated the whole side of the pelvis. The kidney was replaced and a sinus persisted for a very short time. Function did not cease.

In regard to these cases of interstitial nephritis, I have had six where there was unilateral bleeding. They were diagnosticated as unilateral hemorrhage from chronic interstitial nephritis. The cause of the bleeding probably is increased intracapsular pressure. When that is relieved the hemorrhage will cease. The principle is almost the same as in splitting the kidney for angioma. In cutting the kidney the veins are severed and the blood supply to the angioma is obliterated. Removal of the capsule in these interstitial cases removes the pressure. There is no necessity for splitting. Removal of the capsule down to the pelvis and replacement of the kidney will suffice. The trouble may return in two or three years. I recall a case that was operated upon once a year for three years for uremia. As soon as the pressure became too great the secretion of urine decreased and the woman became uremic, owing to the pressure exerted by the cicatricial tissue in the fat around the kidney. As soon as the scar was removed a fair degree of health was established which continued for a year.

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I do not think there is any necessity to worry when the pelvis of the kidney is cut, as long as there is good drainage. It will heal and there is very little liability of sinus formation. Of course, if the pelvis is markedly infected or contains a foreign body, the same condition exists as in the bladder under like conditions. The sinus will persist until the foreign body is removed.

DR. J. DELLINGER BARNEY of Boston: I was very much interested in the case which Dr. Peterkin reported of persistent urinary fistula that was secreting urine into a cavity formed by adhesions between the intestines, and where the ureter had been divided some months previously. This was a fortunate result, but in a considerable experience with animals in the laboratory I find this is not at all a constant result, and is not to be considered as something which is at all likely to happen. The chances are, that instead of there being a cyst formed by the intestines, there will be an obliteration of the proximal end of the ureter with a subsequent dilatation of the kidney, and probable destruction of the organ. Whether this occurs or not we may expect an infection of the ureter, probably hematogenous, possibly by the transmission of bacilli through the intestinal wall, and you will get an infected cyst with an abscess. Therefore a cut ureter, no matter how well it may secrete into the cyst or through the abdominal wound, is to be regarded always as a dangerous proposition and obliterated at once either by anastomosis, by establishment of some fistula where drainage will be complete, or by nephrectomy.

DR. PETERKIN: In regard to splitting the capsule and saving the kidney. I think that would be sufficient, but in this case the kidney was removed to save the patient's life. She had been bleeding for several years, had had an operation on the other kidney previously, and was very anemic. There was continual bleeding, and the question came up whether we would save her life by stopping the bleeding. The kidney was taken out, and her recovery corroborated the diagnosis. I think, as Dr. Warren has said, that we can do better by splitting these kidneys. I have seen in my own practice that this hemorrhage often comes from both kidneys, but there are cases that are unilateral.

Dr. Barney spoke of the danger of infection in these cases of fistula. It will not become infected if properly taken care of. This kidney was opened up within twenty-four hours afterwards, the kidney did not obliterate itself, and continued to functionate

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actively. When I catheterized below I found that they had tied off everything so the kidney was excised.

DR. KOLISCHER: In the discussion of the two cases of prostatectomy Dr. Lewis missed the point. The preparatory treatment is indicated if there is time to do it. If a patient's bladder is very much distended, filled with clotted blood, then we have to open the bladder quickly, whether he is bleeding from the prostate or from a neoplasm. That is so obvious that it does not even take the experienced surgeon to act in such a way. If a man is bleeding to death then you have got to stop the hemorrhage. It is just the same thing if a man has cut his radial artery and you were to give him Blaud's pills, instead of ligating the artery. If the bladder contains coagulated blood it cannot be drained through an instrument. If the bladder is transformed into a solid tumor and the man shows signs of anemia, then there is no time to be lost by trying to show one's skill in introducing a rigid instrument. Suppose I should have poked around a little while and succeeded in forcing an instrument into the bladder, I certainly would have taken a long chance of injuring the spongy, bleeding prostate still more, and yet could not have removed the clotted blood. So, while I strongly believe in preparatory treatment, I am not going to waste time in preparatory treatment when a man is bleeding to death, and his bladder is distended by a blood cake. If we open the bladder then the next thing to do is to remove the source of the hemorrhage. Suprapubic prostatectomy done on such a big prostate does not complicate the case very much.

Dr. Boehm asked me about tying off the extremities in bladder surgery. I do, and I am very much satisfied with it. Most surgeons, who have seen me do it, employ the same procedure because they have found out that it is a good thing.

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THE PHENOLSULPHONEPHTHALEIN TEST IN SURGERY OF THE GENITO-URINARY TRACT.

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The clinical application of this substance in functional kidney diagnosis was first demonstrated by Rowntree and Geraghty, who have worked out a very simple and accurate technique. The limitations of the present-day methods of functional diagnosis have placed this test in a commanding position. We believe that this test, which is not only simple and convenient to carry out, but combines with these advantages the fundamental requirements of accuracy and reliability, is one which is certain to win for itself in a very brief time a most prominent place in diagnostic methods of urinary surgery. In our work we have aimed to follow as closely as possible the technique described by Rowntree and Geraghty. The phenolsulphonephthalein used was the standard solution purchased from Hynson, Wescott & Co., Baltimore.

We have used three channels for introducing the phthalein into the general circulation, namely, subcutaneous, intramuscular and intravenous. No attempt was made to keep separate records of the subcutaneous and intramuscular cases. The variation in the time of appearance was so slight as to make little difference, *for practical purposes*, in as much as we have attempted to limit ourselves to the

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practical, clinical application of this test. The subcutaneous injections were made in the anterior aspects of the forearm or thigh. The sites chosen for the intramuscular injections were either the anterior thigh muscles or the gluteal muscles. Up to the present we have given the drug intravenously in twenty cases.

In cases with pathological processes in the lower urinary tract, such as contracture of the neck of the bladder, stone, or tumor, senile enlargement of the prostate, urethral stricture, etc., we have employed the mixed urine for determining the renal function prior to instituting any surgical procedures. Before the test is carried out it is best to first determine, if possible, whether a retention of urine is present, by means of a catheter. This catheter can then be left *in situ* until the first pink color appears in the alkali solution. The subsequent mode of procedure varies with the individual case. If there is no retention of urine the catheter is withdrawn and the patient voids his urine at the end of one and two hours respectively.

In those cases in which a retention is present one or two modes of procedure may be carried out; either leaving the catheter in the bladder for two hours and changing the receptacles at the end of the first hour, or withdrawing the catheter as soon as the dye appears and then passing a catheter at the end of the first and second hours. After the ureteral catheters have been passed or the bladder catheter has been fixed, it is best to wait a few moments before injecting the dye to see that the catheters are draining properly and the kidneys are secreting well, otherwise some error in the time of elimination will occur. The ends of the catheters are then placed into previously marked test tubes containing one drop of a twenty-five per cent solution of sodium hydroxide and the time noted when the first pink color appears

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in the urine. The phenolsulphonephthalein imparts a golden color to the urine. As soon as the urine comes in contact with the sodium hydroxide solution in the test tube it assumes a beautiful pink or purplish-pink color.

In all cases in this series regardless of the mode of administration of the drug six milligrams were given at each injection. In this we followed the advice of Rowntree and Geraghty, who stated "that in their early work they used doses varying from three to sixty milligrams, but it was found that the large doses have a color so intense that great dilution became necessary for quantitative colorimetric estimation. Six milligram doses have been selected as most satisfactory for the majority of cases." In our later work we have been using a standard solution containing six milligrams to the liter.

NORMAL CASES.

Our first work was carried out in a series of sixteen cases in which there were no existing lesions of the kidneys so far as could be determined. The time of appearance varied from seven to twelve minutes. Geraghty and Rowntree in their normal cases found the drug in the urine in five minutes after its administration. We have had one case in which the drug appeared in five minutes. This, however, we found to be the exception rather than the rule. But in as much as the lower time limit is not of so much importance as the upper, we shall return to this time appearance of the drug further on in this paper. The percentage of drug excreted during the first hour varied from 20.46 per cent to 60.975 per cent, and the figures for the second hour were from 8.77 per cent to 37.87 per cent. The total output for the two hours varied from 47.13 per cent to 71.52 per cent.

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BLADDER AND PROSTATE CASES.

We have used the phthalein test in obstructive and non-obstructive lesions of the lower urinary tract, including cases of vesical calculi, tumors of the bladder and prostate, contracted neck of the bladder, enlargement of the prostate, urethral strictures and retention of urine due to lesions of the central nervous system.

The value of determining the renal function prior to instituting operative procedures on the lower urinary tract is coming to be recognized more and more. The importance of this procedure cannot be overestimated, and the determining of the renal function is of great value when considering the contraindications for operative treatment. It therefore becomes a factor in establishing a prognosis in given cases prior to operation. This is an aspect of the operative treatment which has been woefully neglected in the past, and is still neglected by a large majority of operators today.

Paschkis, from Zuckerkandl's clinic, working with this object in view, used for his basis the determination of the excretion of urea, the chlorides, specific gravity, albumen and the indigo-carmine test. We shall consider only his findings and results with the indigo-carmine test. He found that in cases of enlargement of the prostate in which the patients were suffering from urosepsis there was delayed appearance of the blue color in the urine after the administration of indigo-carmine. When these patients were treated with a permanent catheter the indigo-carmine appeared earlier in the urine than it did prior to the permanent catheter treatment.

Paschkis further noted that in the cases in which regular catheterization had been employed, avoiding an overdistention of the bladder, and where the

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patients did not have symptoms of urosepsis, and in those cases in which a very small amount of retention of urine existed, the findings with the indigo-carmine test were nearly normal.

In cases in which a permanent catheter had been used for a long time, and the polyuria did not markedly diminish, although there seemed to be an apparent subjective improvement, do not show any improvement in the delayed excretion of the indigo-carmine by this method. He further believes that by the indigo-carmine test cases can be recognized in which kidneys are seriously damaged.

It is obvious that any method which can accurately and conveniently be used to determine the functional capacity of the kidneys will probably be of great value in reducing the mortality of these operative procedures. This has been our experience in a number of cases, a few of which we will quote below, but before so doing we wish to take up this group of cases as a whole.

There were thirty-one cases in this group, embracing the lesions as previously mentioned. We will consider only twenty-three at this time, as in eight of them the phthalein was administered intravenously, and they will be discussed with the other intravenous cases. The time of appearance varied from six minutes to seventy minutes. Considering the percentage of drug excreted we find that during the first hour the excretion varied from 14.05 per cent to 64.91 per cent. During the second hour the lowest amount excreted was 7.03 per cent and the highest 26.59 per cent. The total for the two hours varied from 29.15 per cent to 74.725 per cent.

We wish to discuss this subject relative to surgery of the prostate under three headings: (1) Cases of low readings brought up to standard by the preliminary treatment; (2) Cases of low excretion, operation

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and recovery; (3) Cases of low excretion, no preliminary treatment, operation and death.

It may not be out of place at this point to discuss very briefly our general plan of carrying out the preliminary treatment. As so frequently happens, these old patients suffer from more or less chronic constipation, with its train of symptoms. For two or three days they were given one to two grains of calomel daily, followed by salines. Enemata given as required. Thereafter daily doses of the vegetable cathartics, such as cascara or rhubarb.

The activity of the skin is increased by daily warm baths, either tub baths or electric light baths. Great care is exercised to avoid any fatiguing action of the baths.

Attention to the urinary tract is the factor of greatest importance. We have used treatment by means of the permanent catheter. But frequently these patients cannot tolerate a permanent catheter, in which event one must resort to regular systematic careful catherization. Equally important as the baths and the catheter is the attention given the kidneys. We aim to have the patients drink between 4,000 c.c. and 5,000 c.c. of fluids per day, advising them to drink freely of diuretic drinks, such as hot, weak tea, lemonade, lithia water. If necessary, diuretic drugs are administered.

Case No. 3. Chart 2. J. McK. Age, sixty-four years. Present illness: Patient states that his present illness began five years ago, at which time he passed a calculus from the urethra. Nine months before entering the hospital he had a sharp attack of hematuria, lasting for three weeks. For the past five or six months he has been passing a catheter and irrigating his bladder twice daily. His chief complaint at time of entering the hospital was frequency of urination, about once every two hours, both day

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and night. The urinary act was accompanied with great pain in the tip of the penis and burning pain in the urethra. At times he had a sudden interruption in the urinary flow.

Cystoscopy: Marked cystitis and trabeculization of bladder. A phosphatic stone size of a Brazil nut was seen. Rosette-shaped prostate. Per rectum: slightly enlarged prostate. General conditions: Arteriosclerosis marked. Greatly emaciated, general appearance of suffering. Pulse very regular. Phthalein test: Six milligrams injected subcutaneously. Time of appearance fifty minutes; total drug excreted 43.47 per cent.

These figures show both a delayed time of appearance of the drug, as well as a diminished output. The indications for improving the renal function were quite evident. The patient was accordingly treated with irrigations, permanent catheterization, baths, diuretics and cathartics, and a second reading made four days later, with the following results: —

Time of appearance, twenty minutes; total drug excreted 53.5 per cent.

The improvement in the renal function was apparent and showed a quick response to the preparatory treatment. The treatment was continued a few days longer and a third injection given. Time of appearance, thirteen minutes.

Operation: Suprapubic prostatectomy, with removal of stone. Uneventful recovery.

Case No. 2. Chart 2. M. S., age, sixty years. Present illness: The patient stated that he has had more or less trouble with urination for many years, which began so slowly that he cannot fix a definite time of its onset. He first noticed a twisting of the stream, and that it was gradually getting weaker. He was obliged to urinate about seven times during the day and from one to three times during the night.

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At times he was obliged to strain a great deal to get the stream started. Ever since the onset of his urinary trouble he has been suffering from "dyspepsia," for which he took internal treatment, laying more stress on his gastric symptoms than he did on the urinary symptoms.

Physical examination: A frail, delicate, poorly nourished, very anemic man. Eyes react to light and accommodation. Tongue badly coated. Heart and lungs negative. Abdomen negative. Skin: loss of adipose tissue, pale color, flaccid. Glandular system, bilateral inguinal enlargement. Poorly developed musculature. External genitalia negative. Rectal examination: prostate enlarged; about the size of a large peach, smooth and soft. Both seminal vesicles palpable. Cystoscopy: No cystitis. Trabeculization of the bladder. Collar-shaped enlargement. Retention, 120 c.c. Urine, clear, acid, 1,022; albumen, 0; sugar, 0; microscopically negative. Phthalein test March 27, 1911, time of appearance, ten minutes; total output, 49.28 per cent.

It was decided to improve, if possible, the activity of the kidneys so as to increase the total output of phthalein. The patient was accordingly placed upon our preliminary treatment, to which he very quickly responded, as can be seen from the second and third test: March 30, 1911, time of appearance, nine minutes; total output, 62.96 per cent. April 3, 1911, time of appearance, six minutes; total output, 71.94 per cent.

As a result of carrying out the preliminary treatment for eight days the time of appearance came down from ten to six minutes, and the total output increased from 49.28 per cent to 71.94 per cent. Suprapubic prostatectomy. Uneventful but protracted convalescence due to a slow wound healing, because of the patient's poor general state of health.

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Case No. 16. Chart 2. G. J., age, fifty-four years. Diagnosis: vesical calculi. For the past eight months the patient has had great difficulty in passing urine, and the act of urination was accompanied by severe pain. The pain was usually confined to the bladder, but often it radiated into the glans penis. He has been suffering from frequency of urination for several years. During the past eight months he was obliged to void urine about once every hour during the day, and about every forty-five minutes during the night. An epididymo-orchitis which was present the patient attributed to a recent injury. Three years ago the patient began having attacks of renal colic. In all he has had about ten attacks. Not infrequently he passed small calculi per urethram following these attacks. Nine years ago he had a severe attack of typhoid fever accompanied by cystitis which persisted for five months.

Examination: Head and neck negative; lungs, negative; heart, hypertrophy and mitral insufficiency; abdomen, tenderness on pressure over hypogastrium. Right half of scrotum enlarged, a small discharging sinus is still present at the site of a former operation. Per rectum: small, non-sensitive prostate. X-ray showed shadows compatible with those of bladder stones. During examination with a stone searcher a distinct click was elicited. Blood pressure, 195–200; leucocytes, 12,500. Urinalysis: acid, amber, 1,015; albumen, 0; sugar, 0. Many red blood cells. Pus cells very many. Few epithelial cells, no casts. Functional test: Six milligrams of phthalein injected subcutaneously Jan. 4, 1911; time of appearance, fifteen minutes; total output, 33.97 per cent for two hours. The second test was carried out two days later, with the following result: time of appearance, thirty-one minutes; total output for two hours, 34.08 per cent.

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The patient was treated locally by means of bladder irrigations of warm boric acid solution. Internal administration of urotropin. The patient was put upon forced administration of water, sitz baths and free catharsis, and a permanent catheter was inserted into the bladder part of the time.

Third test, January 13, 1911, nine days after the first test: time of appearance, twenty-five minutes; total output for two hours, 44.81.

Of unusual interest in this case is the variation in the time of appearance of the drug. Instead of the preliminary treatment having the effect of shortening the time of appearance of the dye, it had the opposite effect, namely, of delaying the excretion so that the first appearance of the drug in fifteen minutes, which was normal, was delayed to thirty-one and twenty-five minutes, respectively. The total output of the drug was uniformly low. There was no practical difference in the amount of excretion between the first and second tests carried out, whereas the third test showed an increase of approximately ten per cent. From these figures, one might naturally conclude that we were dealing with badly damaged kidneys, namely, the delayed excretion and the low uniform total percentage of output. Notwithstanding these facts, however, the patient was operated upon. He insisted upon an open operation under general anæsthesia. We concluded that this patient was a bad risk for a major surgical operation from the following data: (1) Hypertrophy of the heart, with mitral insufficiency; (2) The high blood pressure; (3) The low readings of the phthalein test. That these deductions were correct was proved by the final outcome, as the patient died seven months after the operation from cardio-renal insufficiency. The immediate operative result was satisfactory, but before leaving the hospital

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marked signs of cardio-renal incompetency were manifest.

In some of the cases where the total output was either low or high, or the time of appearance was timely or delayed, and if these figures remained constant in subsequent readings during the time that the patient was under the so-called preparatory treatment, our operative results have shown that the prognosis should be guarded. This, we believe, can best be explained as follows: The damaged kidneys are working at their utmost capacity, and hence no matter how much preparatory treatment is given, they can do no more. This inference has usually been correct and can be exemplified by the following case: —

Case No. 25. Chart 2. Mr. W., age, seventy-five years. Diagnosis: prostatic hypertrophy, stricture of the rectum. Present illness: For the past eight or ten years the patient has had more or less disturbance of micturition. For a great many years, at least ten or twelve, he has been obliged to arise from two to five times every night to void urine. The act of urination is gradually becoming more and more difficult, so that he strains a great deal in order to start the stream. Never has had hematuria. One week prior to admission to the hospital he had an attack of complete retention, being relieved by catheterization by his family physician. For the twenty-four hours prior to his entering the hospital he was again able to void urine and it has not been necessary to catheterize him.

Examination: Very pale, poorly nourished man. Pupillary reflexes present. Tongue dry and coated. Neck negative. Heart slightly enlarged to the left. Diffuse bronchitis. Skin of abdomen lax and thin. The distended bladder can be seen and outlined by percussion. External genitalia negative. Rectal ex-

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amination: A stricture of the rectum makes the rectal examination painful and difficult. Prostate is not much enlarged. Retention varied from 500 to 600 c.c. First phthalein test, June 27, 1911, six milligrams, intravenously. Time of appearance thirty-three minutes; total output 53.20 per cent. Second phthalein test, six milligrams intravenously. Time of appearance thirty-nine minutes; total output 59.985 per cent. From these figures we observe a very marked delay in the time of appearance; in fact, the second test required six minutes longer before the dye appeared than did the first test. The total output of drug was fairly good, 53.20 per cent, for the first test and nearly 60 per cent (59.985 per cent) for the second test.

He did not get along very well. He gradually lost strength and flesh, the feet and ankles began to swell, and his mentality at times was disturbed. We therefore gave a bad prognosis, even though the total output of drug was good (60 per cent). Our prognosis was based on the continued delay of excretion of drug plus the clinical symptoms. The retention remained about the same in character and amount, being uninfluenced by regular catheterization and irrigation.

Operation, suprapubic cystotomy for drainage, local anæsthesia. The patient died twenty days later. Post-mortem: Pedunculated median lobe size of a walnut, severe cystitis, with trabeculization of the bladder. The left kidney was very small and contracted. The right kidney contains four large abscess cavities and ten or twelve smaller abscesses in the cortex. Both ureters were enormously dilated.

The post-mortem showed two bad kidneys, one of which was a small contracted kidney and the other a kidney containing many abscesses. Yet these kidneys were able to sustain life. The total work done

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by both kidneys for a given time was almost up to normal, but these kidneys were not able to eliminate the dye as quickly as normal kidneys. Our inferences and prognosis were correct.

SURGICAL LESIONS OF THE KIDNEYS.

It is now generally recognized that whenever considering operative work on the higher urinary tract, it becomes necessary to estimate the functional activity of each kidney separately, which necessitates the collection of urine from each kidney.

This we have done for many years past, using therefor the methods then in vogue, such as indigocarmine, phloridzin, electrical conductivity and kryoscopy of both the blood and urine.

Case No. 1. Chart 3. N. K., age thirty years. Diagnosis, renal calculi. Present history: Patient has been suffering with typical attacks of renal colic for many years. For the past two years the pain had localized in the back over the left kidney, so that a dull ache was present more or less all of the time. About two years ago he had a severe attack of pain, lasting three days, at which time he passed three calculi from the urethra. At intervals of from three to four months he has had severe attacks of chills, fever and sweats, the temperature rising as high as 104° F. Five weeks prior to entering the hospital he had an attack of renal colic, following which he passed two calculi from the urethra. At this time the urine was very bloody. Patient states that during the attacks he has had great frequency of urination, the desire being almost constant, but he passes only very small amounts of urine.

Physical examination: Facial expression dull, pupils react to light and accommodation. Tongue heavily coated. Heart enlarged downward and outward; second aortic accentuated. Lungs negative.

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Abdomen, the area corresponding to the left kidney is very prominent, bulging and tender; a large mass, irregular in outline, moving with respiration, can be palpated. The mass is about two and one-half to three times as large as a normal kidney. Right kidney negative. Double ureteral catheterization; pus on the left side, clear urine without albumen or casts on the right side. In all five phthalein tests were made, one before the operation, two after the operation, and two eight and nine months later.

Test No. 1, Sept. 30, 1910, six milligrams injected subcutaneously. Time of appearance on the right side five minutes, on the left side twenty-five minutes. Total drug eliminated from the right kidney was 61.37 for two hours. On the left side the color was very faint and reading impossible.

Lumbar nephrectomy, uneventful convalescence. The patient made a rapid and satisfactory recovery. No signs of insufficiency of the remaining kidney. Rapid wound healing.

Test No. 2, Oct. 25, 1910, injected six milligrams of phthalein subcutaneously. Time of appearance twenty minutes; total output for two hours, 45.63 per cent.

Test No. 3, Nov. 3, 1910. Injected six milligrams of phthalein. Time of appearance twenty minutes; total output, 25.47.

Of interest in these two post-operative tests are the two following facts: (1) that there is a marked delay in the time of appearance of the dye from the remaining kidney, which prior to the operation excreted the dye in five minutes, after the operation requiring twenty minutes for excretion. (2) The progressive diminution in the total amount. The remaining healthy kidney, when working with the diseased kidney, prior to nephrectomy, eliminated 61.37 per cent; after the nephrectomy this kidney was able to elimi-

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nate only 45.61 per cent and the third reading only 25.47 per cent.

These findings were not substantiated by the clinical picture, namely, good rapid wound healing, return of appetite, gain in weight, disappearance of all urinary symptoms, patient voiding a clear urine with no signs of renal deficiency. From the results of these figures we would be inclined to say that we were dealing with a progressive insufficiency of the remaining kidney. The patient left the hospital and remained perfectly well for about nine months when he was suddenly seized with severe pain in and along the right ureter. This was associated with chilly feelings and nausea and he returned to the hospital.

Upon readmission the patient stated that he had not voided a drop of urine for twenty-four hours. The anuria persisted for another twenty-four hours, being relieved when the patient passed a small stone through the urethra.

Because of the progressive diminution in his previous figures a fourth test was carried out on July 10, 1911. Six milligrams of phthalein injected subcutaneously. Time of appearance five minutes. Total output for two hours 56.61 per cent.

Test No. 5, July 17, 1911. Time of appearance, seven minutes; total output 60.75 per cent.

The two post-operative tests show a marked decrease in the amount of dye excreted and in the time of appearance. Not having again examined the patient until after the passage of a stone from the remaining kidney, we are unable to say what the functional capacity of the kidney has been during this period of time. But the dye test three days later after the passage of the stone per urethram showed again approximately the same figures as were obtained at the first examination.

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In a previous communication (*Illinois Medical Journal*, Nov., 1910), we suggested the possibility of using phthalein for determining the origin of a painless renal hematuria, when, for example, a patient is seen in the interval during which there is no hematuria. For purposes of illustration let us mention the following case.

Case No. 16. Chart 3. Mr. K. Present complaint, painless hematuria of two weeks' duration. Cystoscopy showed blood coming from the left ureteral orifice. Upon admission to the hospital an entire and complete cessation of all bleeding, so that this urine looked perfectly clear.

Question: Suppose we had not made the above-mentioned cystoscopic examination and demonstrated the left side as being the side which was the source of the hemorrhage, would it be possible to do so by employing the phenolsulphonephthalein test, and thereby demonstrating a difference in the functionating capacity of the two kidneys?

May 5, 1911, phthalein test, injection of six milligrams intravenously. Time of appearance: right, two minutes; left, two and a quarter minutes. Total drug excreted: right, 49.01 per cent; left, 30.45 per cent. Both ureters were catheterized. The difference in the appearance of the dye on the two sides is so slight it cannot be taken into consideration. When we come to consider the total work of each kidney, we note that the bleeding side excreted 30.45 per cent, whereas the well side excreted 49.01 per cent, clearly demonstrating a difference in the functional capacity of the two kidneys.

What is the inference? In this case we are undoubtedly dealing with a recent pathological process which has not had time to destroy a large amount of kidney tissue. In consequence of this the kidney function is still good, but it is impaired to such a

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degree that the impairment can be determined clinically by the use of this test.

Examination of the urine showed the presence of tubercle bacilli, and a guinea pig inoculation for tuberculosis was positive. Diagnosis, tuberculosis of the left kidney.

COMPARISON CASES.

In a previous communication we stated that we are inclined to believe that poor operative results, or the belief that better results can be attained, have been and are the real factors in the devising of tests which are used for purposes of this kind. We further stated that, considering not only all the speculation as to the value and shortcomings of these functional tests, it has, ever since the knowledge of functional activity of the kidneys, been a problem to find and introduce a method that would evercome the objections of those who do not believe in the possibilities of methods which permit of estimation of the functional capacity, which test would also at the same time be easy to carry out, and by which accurate results are obtained, and thereby overcome the opponents who believe that such a test is only of value for the particular time that it is carried out; or again, by those who believe that all color tests are inaccurate and that functional tests often respond in kidneys that are greatly diseased; or again, do not respond in those which are apparently healthy; or again, by those who believe that to simply estimate one substance which may be eliminated should not be taken for a guide as to the power of elimination of other substances.

With the object in view of determining whether or not any difference existed as regards time of elimination between the two commoner agents used in functional diagnostic work, namely indigo-carmine and

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phenolsulphonephthalein, we applied all three tests in a series of eight cases taken at random from our series.

In the group of cases under consideration the primary factor considered was the time of appearance of the dyes and the time of the sugar reaction. All sugar tests were made with Haines's solution. Where possible, percentage readings of phthalein were made, although this part was a secondary consideration, as we tried to determine whether one test would respond more quickly than another. In other words, would one of the agents show a delayed excretion or perhaps an absence, whereas the other tests showed the opposite?

Each patient was given six milligrams of phthalein, forty milligrams of indigo-carmine and five milligrams of phloridzin. In other words, this group is to be a kind of check-up of the various agents with one another.

Briefly the cases and results were: —

Case I. External Urethrotomy for Stricture. The phthalein appeared in sixteen minutes, the indigo-carmine in twenty-two minutes, the sugar reduction occurred in twenty-three minutes.

Case II. Paraplegia following removal of an osteoma of the spine. The phthalein appeared in seventy minutes, the indigo-carmine appeared in seventy minutes, the sugar reduction occurred in seventy minutes.

Case III. Impassable Stricture. The phthalein appeared in eleven minutes, the indigo-carmine appeared in fifteen minutes, the sugar reduction occurred in eleven minutes.

Case IV. Chronic Urinary Retention. The indigo-carmine appeared in seventeen minutes, the sugar reduction occurred in twenty-nine minutes.

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Case V. Prostatic Enlargement. The phthalein appeared in twenty-two minutes, the indigo-carmine appeared in twenty minutes.

Case VI. Chronic Nephritis. The phthalein appeared in eighty-five minutes, the indigo-carmine appeared in fifty-one minutes, no sugar reduction in sixty-eight minutes.

Case VII. Pyonephrosis. The phthalein appeared in twelve minutes, the indigo-carmine appeared in seventeen minutes, sugar reduction in fifteen minutes.

Case VIII. Enlarged prostate with bladder stone. The phthalein appeared in fifteen minutes, the indigo-carmine appeared in fourteen minutes.

Although eight cases is a very small number from which to draw any conclusions, especially in the carrying out of this kind of a problem, still we think that from the diversity of the cases, and that all tests were carried out under the same conditions, we may conclude that the phenolsulphous-phthalein test possesses no especial advantages over the other two drugs, nor does it give any information not given by these two drugs, when we consider only the "*trial of elimination.*"

It must be borne in mind that this applies only to one phase of the test and this statement does not apply to this test on the whole.

CASES IN WHICH THE URINE WAS COLLECTED FOR THREE HOURS.

We decided to collect the urine for three hours in some of the cases and study these in a group by themselves, to determine, if possible, whether or not the elimination of the dye is complete in two hours, and if not, how much is excreted in the third hour, and to determine the practical value. The signifi-

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cance of this will be taken up later on. In all, six cases were studied which will be briefly mentioned below.

Case I. Gumma of the lip. The patient's kidneys, so far as we could determine, were normal. Four days after the administration of 606 intravenously the phthalein test was carried out with the following results: Output for the first hour, 3.63 per cent; second hour, 24.5 per cent; third hour, 10.84 per cent. This gives a total of 74.97 per cent for the three hours. As would naturally be expected in healthy kidneys, the first hour's excretion is the highest, with a gradual diminution for the following hours.

Case II. McN. Urethral strictures. External urethrotomy. Time of appearance, 7 minutes; total output for the first hour, 51.54 per cent; second hour, 16.34 per cent; third hour, 24.27 per cent; total output, 92.15 per cent. Of interest in this case are the high total output and the fact that during the third hour about eight per cent more was excreted than during the second hour.

Case III. H. McN. Enlarged prostate. There were two tests made before operating this patient, one week elapsing between tests, the time of appearance of the drug being fifteen and eleven minutes, respectively. The result of the first test showed respectively, 13.79 per cent, 14.04 and 12.15 per cent, making a total for the three hours of 39.98 per cent. The figures obtained as a result of the second test were, 15.2 per cent, 16.18 per cent and 12.5 per cent, making a total of 43.88 per cent. The most striking fact about these figures is that they do not vary; *i.e.*, we do not see the usual high first hour and low second hour, and, as we would naturally expect, still lower third hour. From the figures it appears that the kidneys were doing their utmost work for each

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hour, and that we were probably dealing with badly damaged kidneys.

Case IV. Mr. S., age, eighty-one years. Suprapubic prostatectomy. Uneventful recovery. Unfortunately, the time of appearance of the coloring matter was not noted in this case. The output for the first hour was only 24.24 per cent, so it was decided to read the second and third hours together, lest each one should be rather pale. The second and third hours' output was 24.38 per cent, slightly more than the first hour alone. In spite of the low general output, this eighty-one year old patient withstood a suprapubic prostatectomy, making an uneventful recovery.

Case V. Mr. L. In this case during the third hour only 6.17 per cent was excreted, the lowest in the group. Here the second hour execreted 34.72 per cent, whereas the first hour's output was but 21.48 per cent. This was an operative case which showed that one kidney was devoid of all renal tissue.

Case VI. Miss J. Tuberculosis of the left kidney. The diseased kidney excreted the dye in twelve minutes, 6.32 per cent for the first hour and second hour together, and none for the third hour. The well side excreted the dye in seven minutes, with the following results: 6.3 per cent, 9.79 per cent, 30.99 per cent, total for three hours, 47.08 per cent. A markedly delayed excretion is present on the well side, approximately two-thirds of the dye being excreted in the third hour.

INTRAVENOUS ADMINISTRATION.

We have administered the phthalein intravenously in twenty cases. Its simplicity, its prompt appearance in the urine and the fact that the elimination is

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usually complete in one hour, are advantages distinctly in favor of this method of administration.

These twenty cases include five of renal lesions, namely: painless hematuria, pyelonephrosis, hydronephrosis, hypernephroma and tuberculosis of the kidney; one case of ureteral stone. The lesions of the lower urinary tract were: enlargement of the prostate, seven cases; cancer of prostate, one; carcinoma of the bladder, one; contracture of the vesical neck, two; sexual neurasthenia, two; chronic urethritis, one.

The time of appearance varied from two to thirty-nine minutes. The patient in whom it took the dye thirty-nine minutes to appear was suffering from an enlarged prostate and has been described in detail with the prostatic cases.

Case 16. Chart 6. Patient has been suffering from bladder trouble for several years. Upon admission to hospital his retention was about 600 c.c. daily. Under treatment this has diminished from 600 to 75 c.c. Besides suffering from an enlarged prostate he has well-marked signs of tabes. Time of appearance of drug, twenty-one minutes. Output for first hour, 19.45 per cent; output for second hour, 13.26 per cent; total output for two hours, 32.71 per cent. Whereas the dye normally appears in from two to four minutes and from sixty-five to seventy-five per cent is excreted during the first hour, it takes his kidneys twenty-one minutes to eliminate, and two hours to excrete 31.71 per cent.

Aside from the two cases just mentioned, the time of appearance varied from two to six minutes, as follows: four minutes in five cases, three minutes in three cases, two minutes in two cases, six minutes in two cases, five minutes in two cases, three and one-half minutes in one case, six and four minutes in one case of double ureteral catheterization. The total

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amount of dye eliminated during the first hour varied from 31.34 per cent to 79.46 per cent.

In seven out of these twenty cases the urine was collected for a second hour. The amount excreted during the second hour varied from 9.68 per cent to 29.05 per cent.

DISCUSSION

OF PAPER OF DRS. SCHMIDT AND KRETSCHMER.

DR. HUGH CABOT of Boston: We reported this year at the meeting of the Genito-Urinary Association in New York upon our work with this test up to that time. It was based on one hundred and fifty cases, divided roughly into three classes: those with urethral obstruction, those with inflammatory kidney lesions and those with chronic nephritis, or cardio-renal disease. Taking first the cases of chronic nephritis, which seem to me most important, because that is the rock upon which all tests heretofore have split, if this test can pass that shoal it will be the best test we have. The testimony of its authors as brought out at that meeting was that the test was unsatisfactory. That has not been wholly our experience. In our series of fifty cases of chronic nephritis, there were three in which the condition of the kidney as indicated by the drug and its condition as indicated by other tests and the general condition of the patient failed to agree. There was one patient in the hospital who persistently excreted two per cent in one hour, never over four per cent in two hours. His marked uremia improved and has since remained so, but he will not excrete that drug. Another patient with a marked chronic nephritis, as shown by the ordinary tests, with a very high blood pressure, in poor general condition, excreted forty per cent in the first hour, sixty per cent in two hours, and continued to do so, in spite of which fact he died, and his kidneys showed, as was to have been expected from the physical examination, a high degree of chronic nephritis. These are two striking cases. There was a third one, a child with an acute exacerbation of a chronic nephritis known to have existed for three years. That patient excreted forty per cent the first hour and fifty per cent in the first two hours — a showing altogether better than we should have expected from the apparent degree of damage to the kidney. The patient went on,

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however, to recovery, in so far as chronic nephritis does recover, and left the hospital in good condition.

It does not seem to me that in these cases the correspondence between the test as shown by the drug and the general physical examination was sound, and I am still of the opinion that further work is necessary, particularly along this line, to establish the soundness of the contentions of its authors.

On the other hand, with those exceptions, the drug has stood us in very good stead. In our obstructive urethral lesions it has seemed to us to show with great accuracy the condition of the kidney, and in two cases operated upon against our advice, with very low output, death occurred, and the autopsy showed extensive kidney damage. There was one case that was apparently a failure of the drug, but autopsy showed quite to the contrary. The patient had left renal tuberculosis, and a right kidney that excreted thirty-five per cent of the drug in the first hour. Nephrectomy was performed, the patient did well for the first three days, and then died an apparent kidney death, the output tested two days before death having been only five per cent. Autopsy showed a normal right kidney, hypertrophied to almost twice the normal size, and it was a kidney upon which any one would have been willing to stake his reputation. Of what the patient died we do not know, but there was nothing that the pathologist could find in the kidney to account for a renal death. I am inclined to think that in that case the test did all that it could be asked to do.

We have studied to date something over two hundred and fifty cases. With that limited experience, it is our opinion that the test is better than any functional test yet supplied to us and that it is likely to occupy a prominent place.

DR. WILLIAM E. LOWER of Cleveland: We have not had large enough experience with the test to draw any definite conclusions, but our experience so far would show that it seems to be of greatest value in the prostatic cases, especially where there has been a large amount of residual urine and back pressure upon the kidneys. In a number of such cases the test has given us a very good check on the kidneys and I believe it is going to prove of greatest value here.

DR. G. KOLISCHER of Chicago: The problem of determining the so-called functional capacity of the kidney is such an important one that any attempt to solve it must be hailed with great pleasure. There is, however, one point to which I would call

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attention. All the tests so far suffer, I think, from one shortcoming, that is, that any test that is based on the elimination of a drug or a stain relies on the creating of a more or less arbitrary standard for the kidney. You will remember that some years ago Schmidt and I conducted a series of experiments which we thought entitled us to form a thesis, that each kidney is a standard unto itself. It seems, judging from the reports, that this new method comes nearer to the ideal of catching the kidney in its function. All these methods are important, even if they should finally prove to be not as good as we think now, because they call increased attention to the problem and build up a foundation for further investigations, so that we finally will be able to work with absolutely no mistakes due to fundamental shortcomings. There is no method which will cover every case, and no method which is infallible.

DR. A. D. BEVAN of Chicago: I should like to say one word from the standpoint rather of the general surgeon than the genito-urinary surgeon in looking at this matter of determining the functional capacity of the kidneys in both kidney work and in bladder work. We all have that problem to contend with, and we are all very anxious to obtain information as to the functional capacity which will enable us to determine in an individual case whether to operate or not. I have thought about the problem a good deal. We have not in my own clinic done any considerable amount of work with the tests which have been discussed — that is, the indigo-carmine test, or the phloridzin test, or this later test of Geraghty and Rowntree. We have, however, done quite a lot of work with cryoscopy. In looking at the whole problem, it seems to me that so far we have not obtained any test which is of great value in determining in a given case whether to operate or not. It has not seemed to me that any of these tests are determining, in a particular case, where we must answer the question, shall we operate on this man and remove his prostate, or shall we operate on this man and do a nephrectomy instead of a nephrotomy? It does not seem to me that the elimination of a certain drug in a given time, or the elimination of a certain percentage of that drug, really testifies to the kidney capacity. I have been rather led to the conclusion that we could arrive in a much safer way as to whether to operate or not from the gross clinical findings in the case — that is, the general condition of the patient and the total kidney output, that is, the total kidney output studied in a series of several twenty-four hours. That has been a value,

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for instance, in our prostatic work in our clinic — and then as far as the question of determining whether or not to do a nephrectomy in a certain case instead of a nephrotomy, I believe we should be guided by this rather simple proposition, that in an individual who is a fair surgical risk in a broad way as far as his general condition, his hemoglobin, his temperature, the whole clinical picture — who is a fair surgical risk, who in several twenty-four hours has a fair and reasonable amount of kidney output, then when we are confronted with the kidney itself at the time of operation, if the gross appearance of the kidney, if necessary on splitting open the kidney and seeing the kidney as it is laid open, in a stone case or a case of tuberculosis, or a case with abscess, if the gross appearance of that kidney is such as to lead one fairly to conclude that it is not doing any considerable proportion of the work as gauged from the twenty-four hour specimens, then it is quite fair for us to assume that the other kidney is doing the bulk of the work and sufficient work for us to proceed with a nephrectomy. In other words, I think the commonsense method of looking at this problem is still today of more importance than any of the more refined means of kidney determination that have been introduced — and, after all, gentlemen, the practice of surgery should be the practice of common sense.

DR. KRETSCHMER: In regard to the colorimeter, we have been using the Du Boscq and believe it is more accurate than the hemoglobinometers.

The intravenous method is just as easy as the subcutaneous or intramuscular. There is no pain, no inconvenience, and more of the drug is eliminated in one hour. The entire process is complete in one hour, so that we prefer it as being more rapid. Of course, no method that has been devised up to the present time is perfect, and what every one is striving to do is to get an infallible method. Up to the present time such a method has not been found, but we think this is the nearest approach. Of course, there are exceptions to all these functional tests, but we believe that there are less to this than any of the others. For example, in one of the kidney cases cited in which the man made a complete recovery, the phthalein kept going down. Nine months later when the subsequent tests were performed on him, they were normal again. Whether or not this diminution in his phthalein was due to stone in the ureter which he passed later, we not do know, of course.

Regarding the value of this test in selecting the cases, we have

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published in the *Illinois Medical Journal* one or two cases, and I would like to cite one of them, in which we believe this test enabled us to determine what should be done. An old gentleman with complete retention of urine, who had been catheterized for many weeks, was brought into the hospital. The phthalein test was carried out, and did not appear for fifty or sixty minutes. At the end of two hours there was a such faint trace of drug that it was impossible to make a reading. We advised this patient to have preparatory treatment and not to be operated upon. The doctor, however, had sent him in for operation. Catheterization was very painful. He was in bad shape, and his family insisted that he be operated on right away. We advised waiting. Against our wishes, however, and not relying entirely upon the correctness of the test, as this was one of the first cases, we operated, and the man promptly died on the third day of anuria.

On the other hand, those cases mentioned in which the function has been improved all went on to uneventful convalescence.

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AMERICAN UROLOGICAL ASSOCIATION.

CONSTITUTION.

ARTICLE I.

NAME.

Section 1. The name of this organization shall be The American Urological Association.

OBJECT.

Sec. 2. The object of this Association shall be the study of the medical and surgical diseases of the urinary organs in both sexes.

ARTICLE II.

MEMBERSHIP.

Section 1. The membership of this Association shall be composed of those whose scientific work contributes to the progress of this branch of medical science, who shall be grouped as (a) Active, (b) Corresponding, and (c) Honorary members; but active members only shall have any right, title or interest in the real or personal property, of funds of the Association, or be eligible for office, or have a right to vote.

ACTIVE MEMBERS.

Sec. 2. An applicant for active membership must be a citizen of North, South, or Central America, the islands adjacent thereto, or any of the American possessions, a graduate of a reputable medical college, duly licensed to practice medicine in the state or country in which he resides, and must have been in active practice for not less than five (5) years.

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CORRESPONDING MEMBERS.

Sec. 3. Any person not eligible for active membership, interested in the study of Urology, on recommendation of the Executive Committee may be elected corresponding member, upon a majority vote of the Association.

HONORARY MEMBERS.

Sec. 4. Distinguished foreign Urologists to the number of twenty may be elected to honorary membership, upon a two-thirds vote of the Association. They shall be exempt from dues.

CERTIFICATES.

Sec. 5. Every member of the Association, on completion of his membership, shall be furnished with a copy of the Constitution and By-laws, and a duly authenticated certificate of membership.

REVOCATION.

Sec. 6. This certificate may be revoked for cause; and in case of refusal to surrender the same, the Association may publish such revocation in its official journal.

RESIGNATION.

Sec. 7. Any member who has complied with all the requirements of the Constitution and By-laws may resign his membership, by letter to the General Secretary, or the local Secretary; but no resignation shall be valid until accepted by his Society or the Association.

DISCIPLINE.

Sec. 8. For violation of any of the rules or regulations of the Association, or for unprofessional conduct, a member may be reprimanded or suspended, by a two-thirds vote of the Executive Committee. Whenever the Executive Committee deems it advisable to recommend a member of the Association for expul-

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sion they shall notify him, in writing, in a sealed envelope, by mail, at least seven (7) days prior to the date set for action by the Association; otherwise no vote to expel shall be taken. A three-fourths vote of the members present shall be necessary to expel.

ARTICLE III.

OFFICERS.

Section 1. The officers of this Association shall be a President, Vice-President, Honorary Vice-Presidents, a General Secretary, General Treasurer, and an Executive Committee, who shall be elected at the annual meeting, and shall hold office for one year. Candidates for office must be active members in good standing, must be nominated according to the procedure prescribed in the By-laws (Sec. 17, *et seq.*), and must be elected by a majority of the members present at the annual meeting.

OFFICIAL VACANCIES.

Sec. 2. Vacancies in the offices of General Secretary or of General Treasurer may be filled by the Executive Committee for the unexpired term.

ARTICLE IV.

EXECUTIVE COMMITTEE.

Section 1. The administration of the Association shall be in the hands of an Executive Committee, composed of (a) members *ex-officio*, viz.: the President, Vice-President, General Secretary, General Treasurer, for the time being; and (b) one member from each of the Sections laid down in the By-laws (Sec. 17).

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ARTICLE V.

STANDING COMMITTEES.

Section 1. The Standing Committees of this Association to be appointed by the President shall be:

(a) Committee on Membership.
(b) Publication Committee.
(c) Auditing Committee.
(d) Committee on Arrangements.
(e) Committee on Program.

NOMINATING COMMITTEE.

Sec. 2. A Nominating Committee, selected by and from the various members of the several Sections present at the annual meeting as prescribed in the By-laws (Sec. 16).

ARTICLE VI.

BRANCH SOCIETIES.

Section 1. For the more active propagation of the work of the Association, fifteen (15) or more active members may, with the consent of the Executive Committee, organize a branch, to be entitled "The ———— Society of The American Urological Association." Each Society shall elect its own officers, adopt by-laws, in conformity with those of the Association, and retain its own autonomy.

HONORARY VICE-PRESIDENT.

Sec. 2. The President of each branch Society shall be, *ex-officio*, an Honorary Vice-President of the Association.

ARTICLE VII.

AMENDMENTS.

Section 1. Amendments to this Constitution must be sent in writing to the Executive Committee at least one month before the annual meeting, be printed

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on the notice of the meeting which is sent to each active member at least one week prior; and may be adopted by a two-thirds vote of the members present.

BY-LAWS.

MEETINGS.

Section 1. The annual meeting shall be held on Monday, Tuesday, and Wednesday of the same week, and in the same city as the annual meeting of the American Medical Association or at such other time and place as the Association may from time to time determine. Morning sessions, 9.30 a.m. to 1 p.m.; afternoon sessions, 2 to 5 p.m.

SPECIAL MEETINGS.

Sec. 2. A special meeting may be called at any time, by the President, a majority of the Executive Committee, or upon the written request of ten (10) members, at such time and place as the Executive Committee may designate; notice of which meeting shall be sent by mail to each active member at least fifteen (15) days prior, stating the place, date, hour and special business for which the meeting is called; and no other business shall be conducted or enacted except that stated in the call for the meeting.

QUORUM.

Sec. 3. At all stated and special meetings, fifteen (15) members shall constitute a quorum for the transaction of executive business.

ANNUAL DINNER.

Sec. 4. The annual dinner, subscribed for by the members, who may invite their friends to participate, *pro rata*, shall be held on Tuesday evening.

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SCIENTIFIC SESSIONS.

Sec. 5. The Order of Business at the scientific sessions shall be:

(a) The President's Address.

(b) Original Communications.

(c) Presentation of Patients, Specimens, Apparatus, etc.

PAPERS.

Sec. 6. Titles and abstracts of papers must be filed with the General Secretary at least one month before the date of the annual meeting; and by him presented to the Committee on Program for consideration and approval. Any paper previously printed or presented before a scientific society cannot be read before this Association except at the request or on the approval of the Committee on Program.

TIME LIMIT.

Sec. 7. The reading of papers shall be limited to twenty (20) minutes; and discussion to five (5) minutes.

SPECIAL PAPERS.

Sec. 8. Unexpired time, before the close of the sessions, may be devoted to the presentation of important communications from authors who failed to file their titles and abstracts at the proper time.

VISITORS.

Sec. 9. Upon invitation of a member, professional visitors may be admitted to the scientific sessions, but only members may present or discuss papers, except upon the invitation of the President or the Committee on Program.

MANUSCRIPTS.

Sec. 10. A copy of all papers read must at once be handed to the General Secretary for publication in the transactions, subject to the approval of the Publica-

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tion Committee; the latter reserving the right to return to an author his paper for condensation or revision, or may decline to accept it for publication if they deem it below the proper standard of scientific excellence.

DISCUSSIONS.

Sec. 11. A stenographer shall be engaged by the General Secretary to report all discussions, which shall be printed in the transactions in conjunction with the original papers.

"READ BY TITLE."

Sec. 12. In the absence of the author, papers upon the official program may be "read by title," and if acceptable to the Publication Committee, may be published, as such, with the transactions.

REPRINTS.

Sec. 13. An author of a paper published in the transactions, may, at his own expense, secure reprints thereof, upon which must be printed the legend "Reprinted from the Transactions (or official journal) of The American Urological Association."

PUBLICATIONS; EDITOR.

Sec. 14. The Executive Committee shall contract for the publication of the Transactions in an appropriate volume or in journal form, and appoint an Editorial Staff, who, in conjunction with the Publication Committee, shall publish the scientific and executive proceedings of the Association. Each active member shall be entitled to receive a copy of the Journal or Transactions gratuitously.

EXECUTIVE SESSION.

Sec. 15. At the executive session, held at the close of the scientific session, the Order of Business shall be:

(a) Reading of Minutes of the Previous Meeting.

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(b) Reports of Secretary, Treasurer, Auditing Committee, Executive Committee.

(c) Reports of Committees on Arrangements, Program and Publication.

(d) Selection of Nominating Committee.

(e) Election of New Branches and Members.

(f) Unfinished Business.

(g) New Business.

(h) Report of Nominating Committee and Election of Officers.

NOMINATING COMMITTEE.

Sec. 16. The officers — President, Vice-President, General Secretary, General Treasurer, and the other members of the Executive Committee — shall be nominated at the executive session by the Nominating Committee, which shall be selected in the following way:

(a) The members from each Section designated in Sec. 18 of these By-laws shall select from their own number one for each twenty of their members in good standing, and present these names to the President for appointment on the Nominating Committee. The members of the several Sections may instruct their delegates as to whom they prefer for officers.

ELECTION.

(b) The Nominating Committee then retire, make their nominations, return and report to the President, who makes the announcement; this to be followed by election. A majority vote shall elect. (Constitution, Art. III, Sec. 1.)

RECESS.

(c) While the Nominating Committee is in session the Association may take a recess, to reconvene when the committee is ready to report.

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INSTALLATION.

(d) The newly elected officers shall be installed at the close of the executive session.

SECTIONS.

Sec. 17. For the purpose laid down in Sec. 16, the Western Hemisphere shall be divided into the following sections:

(a) North Atlantic Section: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Canada.

(b) South Atlantic Section: Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, District of Columbia, Mexico, Central and South America, West Indies.

(c) North Central Section: Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North and South Dakota, Nebraska, Kansas.

(d) South Central Section: Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Arkansas, Oklahoma, Indian Territory.

(e) Western Section: California, Colorado, Arizona, Idaho, Nevada, Oregon, Utah, New Mexico, Wyoming, Washington, Alaska, British Columbia, Montana, Hawaii and Philippine Islands.

INCOME.

Sec. 18. The income of the Association shall be derived from the following sources: (a) *Initiation* — Initiation fee of ten (10) dollars, in lieu of the annual dues for the current year, which must accompany the application for membership. (b) *Dues* — Annual dues of not more than five (5) dollars (the amount to be fixed at each annual meeting), payable by every active member, at the annual meeting, or within three months thereafter. (c) The sale of the Transactions

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or other publications of the Association. (d) *Assessments* — The Association may levy on each active member, one or more assessments, not to exceed the sum of five (5) dollars in any one year; subject to a three-fourths vote of the members present at the annual meeting.

ARREARS.

Sec. 19. Any member three months in arrears to the Association shall be notified thereof, and in the event of non-payment he shall be dropped from the subscription list of the Journal; and if his dues are not paid within a year he shall be dropped from the roll of members of his Society and the Association.

COLLECTION OF DUES.

Sec. 20. The General Treasurer shall collect (a) an initiation fee of ten (10) dollars from each member not affiliated with a branch Society; (b) one-half the initiation fee of members affiliated with a branch Society; (c) the annual dues of not more than five (5) dollars from each active member.

Sec. 21. The Treasurer of each branch Society shall collect one-half the initiation fee of each new member of that Society.

BRANCH INCOME.

Sec. 22. The expenses of branch Societies shall be provided for as follows: (a) One-half of each initiation fee; and (b) Any further expenditure on the part of a branch Society must be met by assessment of its own members.

EXEMPT.

Sec. 23. Honorary and Corresponding members shall be exempt from dues; but if they desire to subscribe for the Transactions or the Journal they may do so at cost price to the Association.

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OFFICIAL DUTIES.

Sec. 24. The duties of the officers of this Association shall be such as usually devolve upon the President, Vice-President, Secretary and Treasurer of an Association.

EXECUTIVE COMMITTEE MEETINGS.

Sec. 25. The President shall call and preside over all meetings of the Executive Committee; and its minutes shall be recorded by the General Secretary or an assistant secretary, whom they may appoint.

STANDING COMMITTEES.

Sec. 26. The newly elected President shall appoint the following Standing Committees (see Constitution, Art. V, Sec. 1):

MEMBERSHIP.

(a) A Committee of three, which shall pass on all applications for membership filed with the General Secretary, and present the same to the Association for election at the annual meeting.

PUBLICATION.

(b) A Publication Committee of three, with the Editor as chairman, which shall have charge of all publications, control of the Journal, and shall publish the scientific and executive proceedings of the Association.

AUDIT.

(c) An Auditing Committee of two, which shall go over the accounts of the General Treasurer, and report to the Association at the annual meeting.

ARRANGEMENTS.

(d) A Committee of Arrangements of five members. which shall secure a meeting hall, and make all the necessary arrangements for the annual meeting and entertainment of the Association.

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PROGRAM.

(e) A Program Committee of two, with the General Secretary as chairman, which shall have charge of the program of the scientific and executive meetings.

GENERAL SECRETARY.

Sec. 27. The General Secretary shall (a) arrange the daily program; (b) keep the records of the general meetings; (c) the minutes of the executive sessions; (d) the minutes of the Executive Committee meetings; (e) take charge of the papers, etc., presented before the Association; and (f) give prompt attention to the correspondence. He shall also (g) keep an accurate list of the members, their applications, addresses, and a roster of attendance at the annual meeting.

GENERAL TREASURER.

Sec. 28. The General Treasurer shall send out bills to all members not in affiliation with a branch society, upon which shall be printed those portions of sections 18 and 19 of these By-laws which refer to the payment of dues and arrears. He shall keep an alphabetical list showing the actual standing of all members; a cash book; and a bank account in the name of the Association.

DISBURSEMENTS.

Sec. 29. The General Treasurer shall not disburse any moneys of the Association except on warrants ordered by the Executive Committee and signed by the President. Payments shall be made only by checks drawn on the account of the Association.

APPLICATIONS.

Sec. 30. Applications for membership in this Association must be made in writing upon blanks provided, sent to the chairman of the Membership Committee of the branch Society, and if by it recommended for membership, a three-fourths vote of those present shall be necessary for election. Residents of a city in which

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there is a branch must make application to and secure membership through the local society.

NON-AFFILIATES.

Sec. 31. Those seeking membership in the Association, residing at a distance from a branch Society, may file their application with the General Secretary or one of the Membership Committee, which shall report at the next annual meeting; a three-fourths vote of the members present being requisite for election.

Sec. 32. All applications for membership must be made upon the following form:

To The American Urological Association,

.....Society.

I, the undersigned, hereby make application for Active membership and enclose ten dollars ($10.00) for initiation fee and dues for the current year.

I graduated from .....
received a license from the State of .....
am a member in good standing in .....
.....
.....
Hospital appointments .....
.....
Teacher in .....

Signed .....M. D.
Street .....
City .....
State .....

Endorsed by .....
.....
Approved by .....

N. B. — This application must be endorsed by two members in good standing, and finally approved by the chairman of the Membership Committee, before being presented to the Society.

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QUESTIONS OF ORDER.

Sec. 33. All questions of order not provided for in these By-laws shall be determined by parliamentary usage as found in Roberts's Rules of Order.

AMENDMENTS.

Sec. 34. These By-laws may be suspended temporarily for a specific purpose, by a unanimous vote, at any stated meeting of the Association. They may be repealed or amended by a three-fourths vote of the members present and voting at any stated or special meeting, provided that the proposed amendment shall have been printed on the notice for the meeting at which such action is to be taken.

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LIST OF MEMBERS
OF THE
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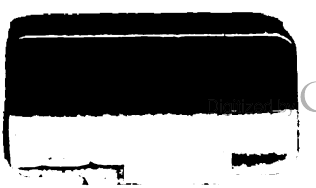

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